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Mazda THE OUTSHINING LIGHT

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Made in England by (B T-H) *Leaders in Lighting*

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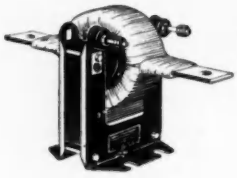
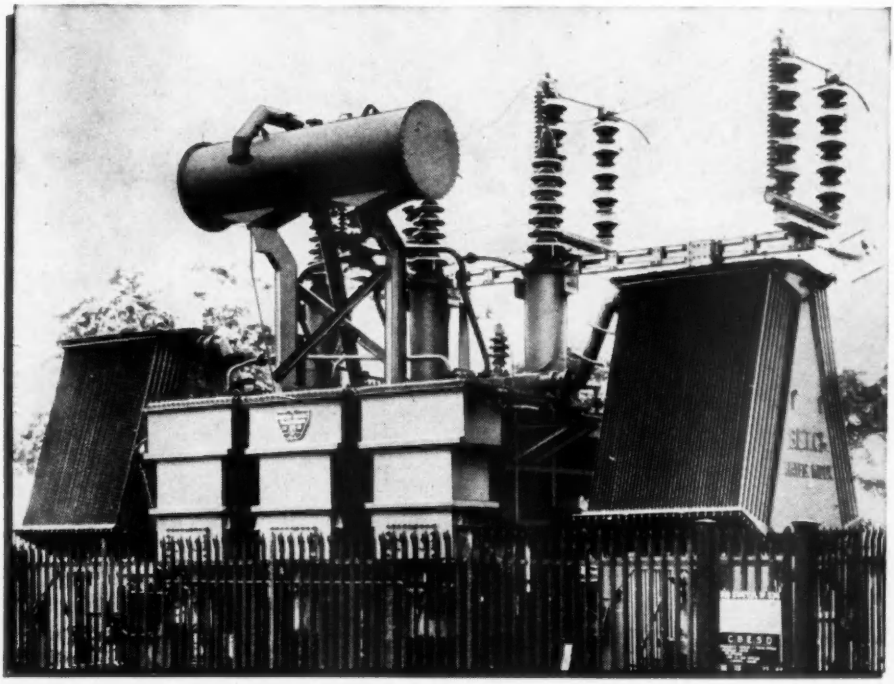


15lb. B.E.T. transformer to protect 60 tons



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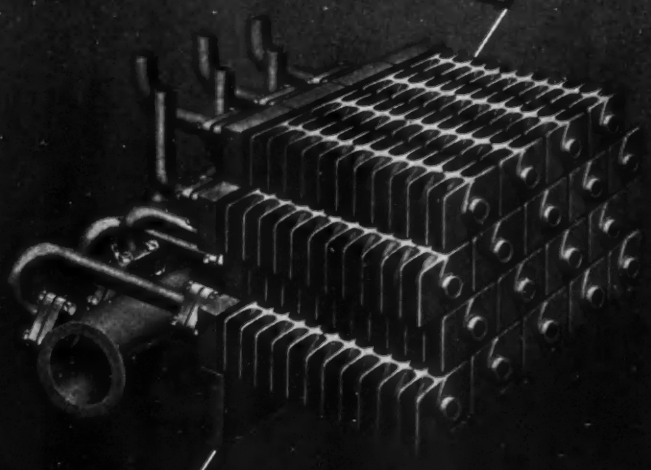

The illustration shows Green's Premier Diamond Economiser, Type 12, with steel tubes and cast-iron gilled sleeves.

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GREEN'S economisers

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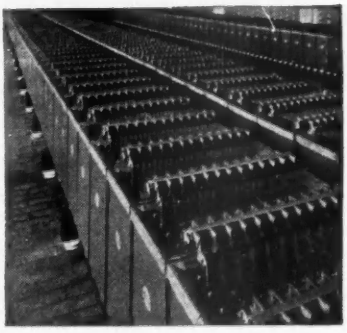

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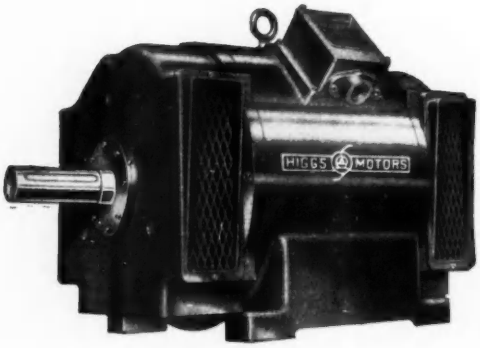

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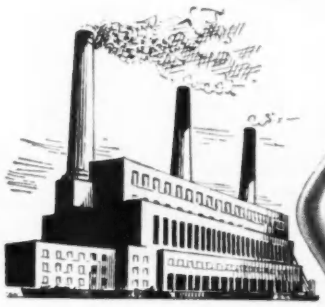

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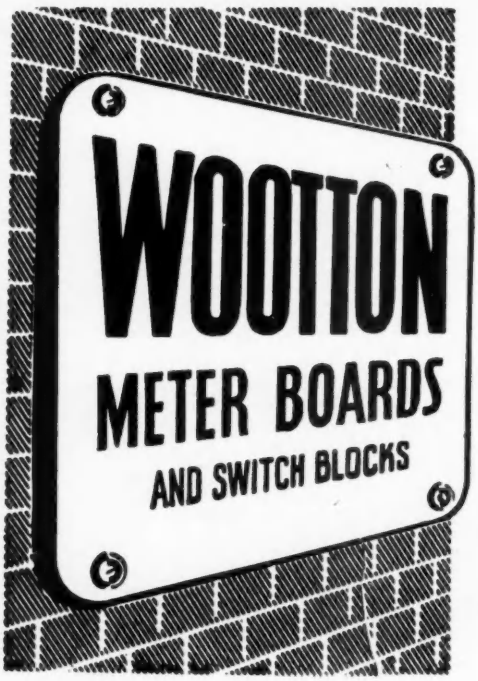

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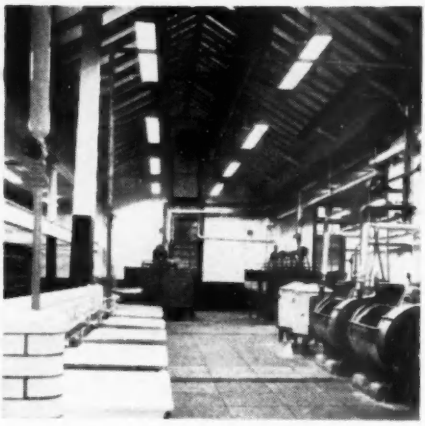

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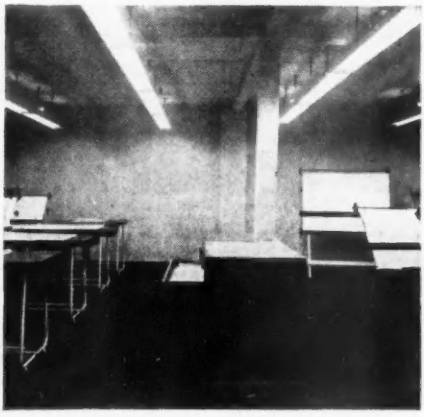

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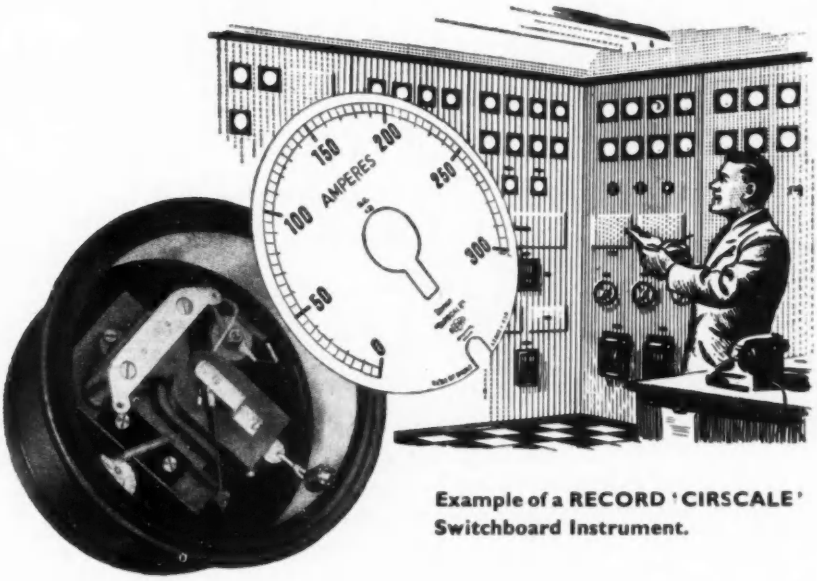

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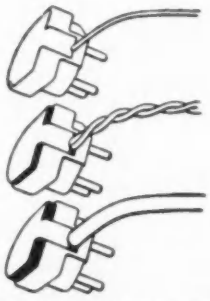
the variable cord grip.

TEMCO Plugs adjust themselves automatically to suit varying thicknesses of flex. There are no loose parts.



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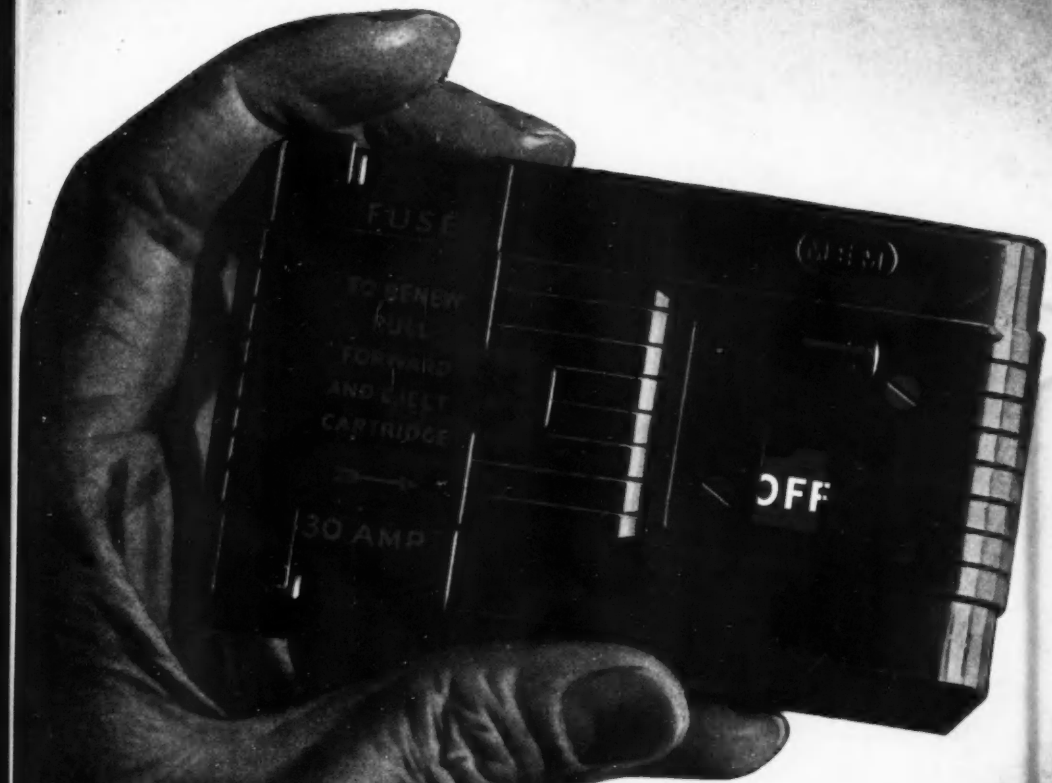

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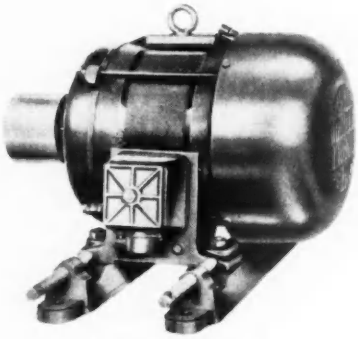

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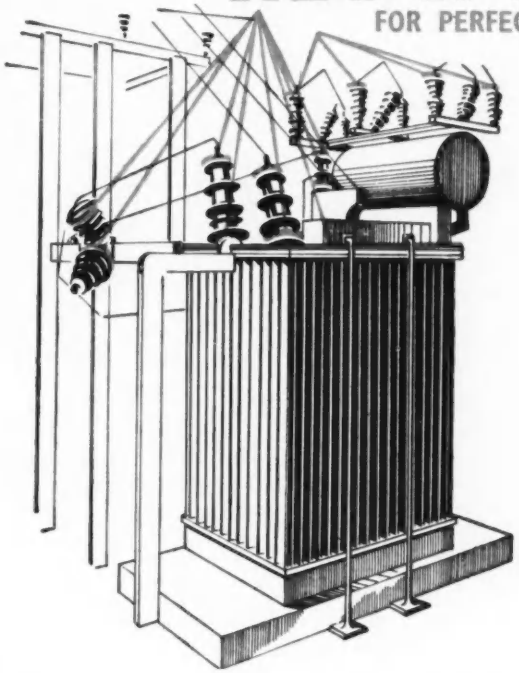

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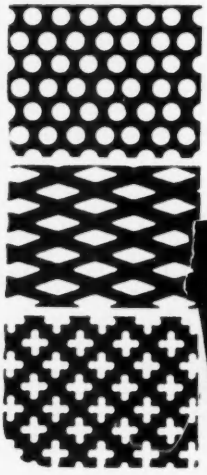

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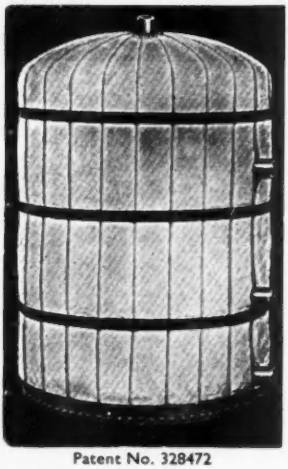

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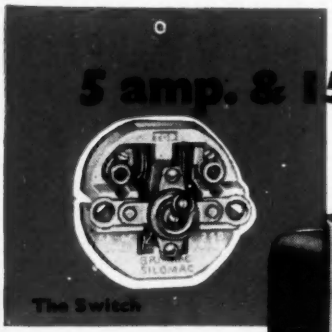
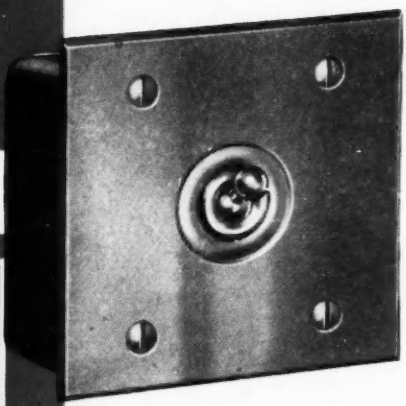
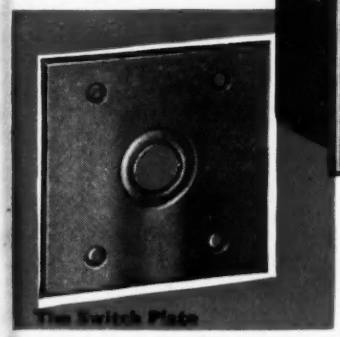
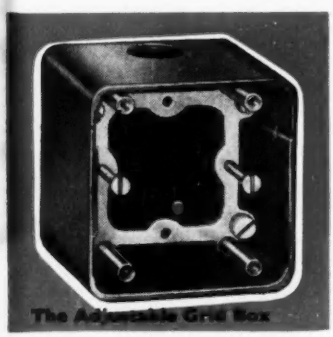


The Switch





The Switch Plate



The Adjustable Grid Box

This flush switch unit is a worthy criterion of all BRITMAC products and is one of a large range of electrical accessories that has been supplied in quantity for schools, technical colleges, hospitals and other public buildings.

All BRITMAC ELECTRICAL ACCESSORIES are characterised by their strength, safety and efficiency over long periods and Installation Engineers who specify BRITMAC products by name are certain of the highest standard of quality, perfection of finish, coupled with a prompt and personal service.

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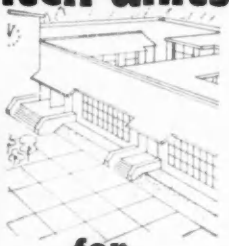
The Switch Plate: Incorporates the cuttered-hole and four corner screws, dispensing with the need for a switch ring. For added safety, corner screws of a 'secret' pattern can be supplied.

The Adjustable Grid Box: Rigidly constructed and designed to give a wide margin of adjustment and the maximum space for wiring.



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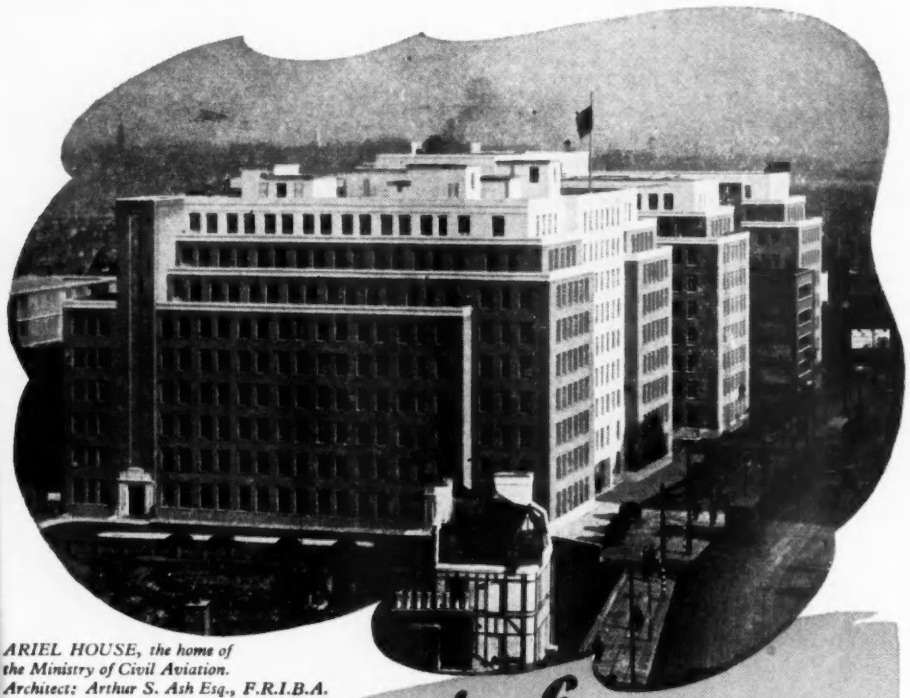

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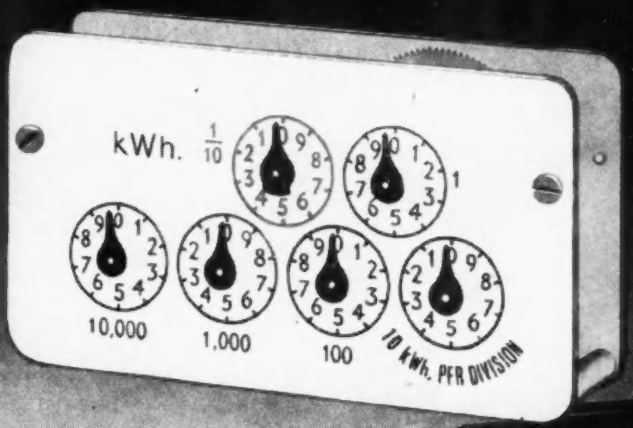

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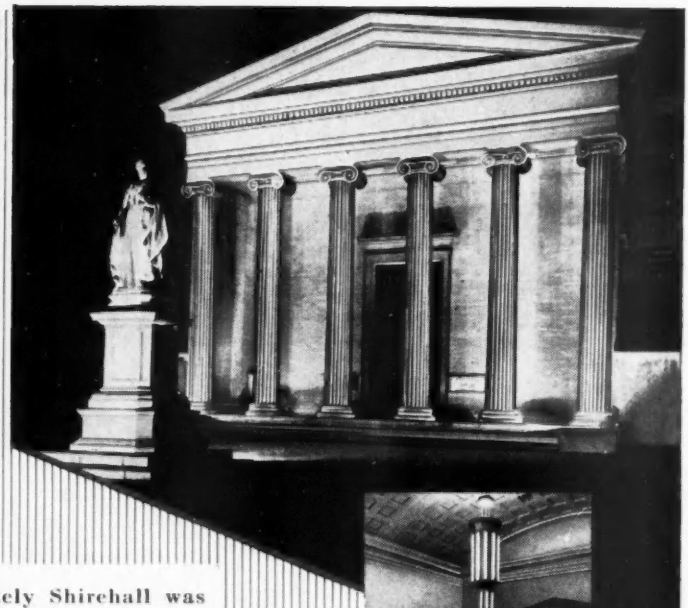

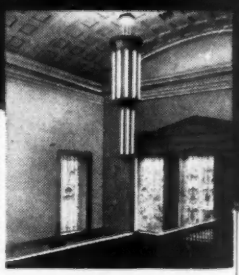

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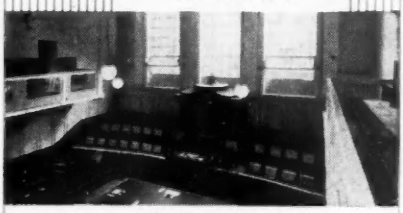
Stately Shirehall was recently rewired to the specification of L. C. Lomas, F.R.I.B.A., County Architect for Worcestershire.

Wiring for 446 lighting, heating and power points was installed by the Contractors, *Messrs. Abell & Smith's Electrical Co. Ltd.*, Angel Place, Worcester, who used BICC V.R.I. Taped, Braided and Compounded Cable throughout.



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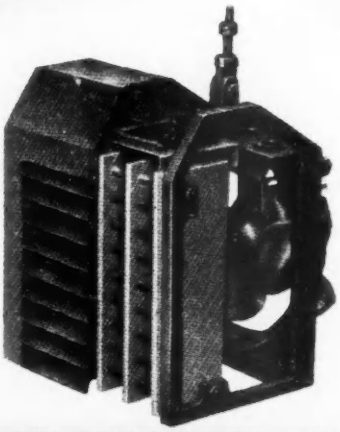

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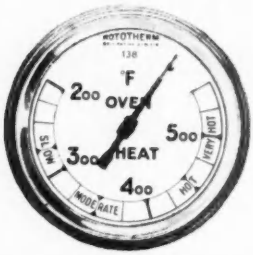

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11 p.m. STREETS SWITCH-OFF

MINISTER'S APPEAL

An appeal to switch off all street lights at 11 p.m., except where essential work is in progress, has been made to street lighting authorities by Mr. Barnes, Minister of Transport. The plea is made in support of the Government's campaign to save fuel.

It is suggested that all lighting should be switched off during period when it would lead ... danger to road use...

From the Daily Telegraph January 16th, 1951

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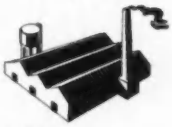
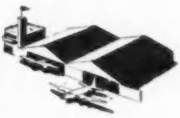


FACTORIES *and Works: Laundries, Breweries*



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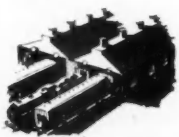

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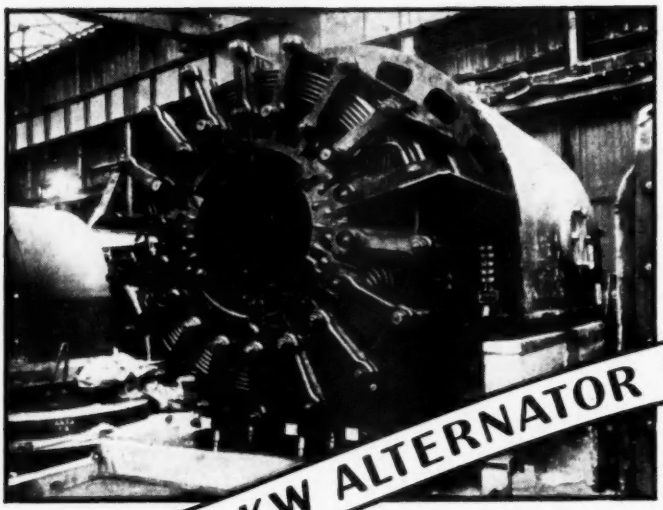

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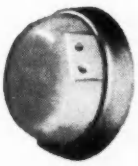

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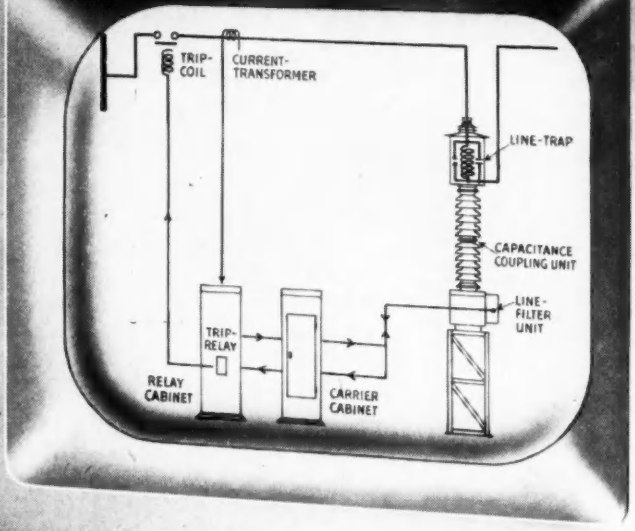

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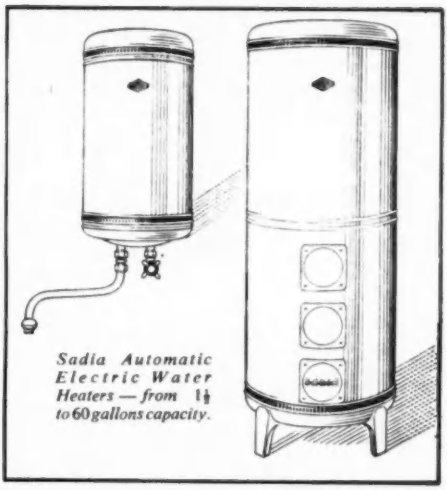

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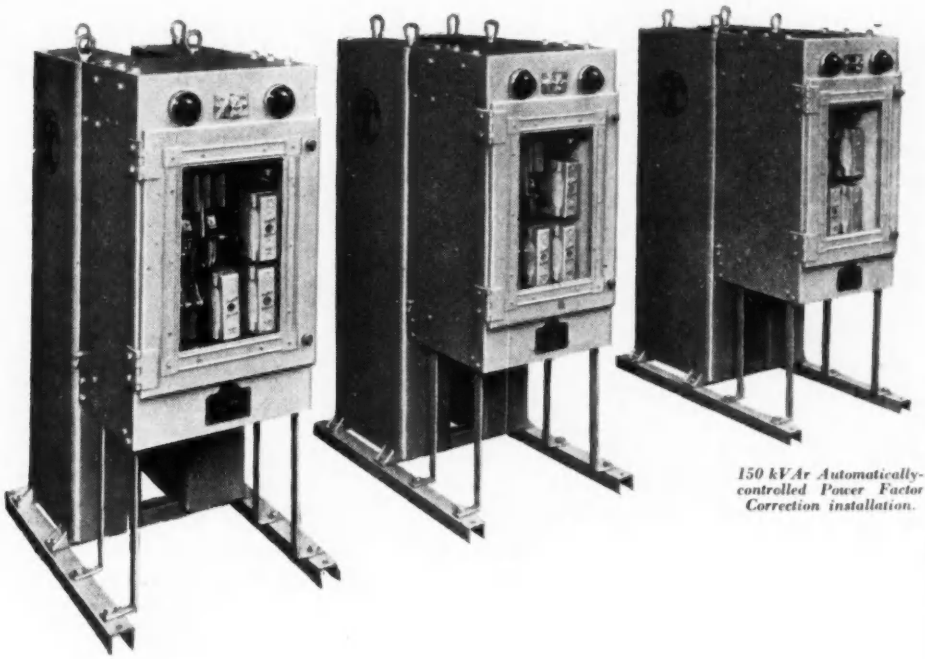

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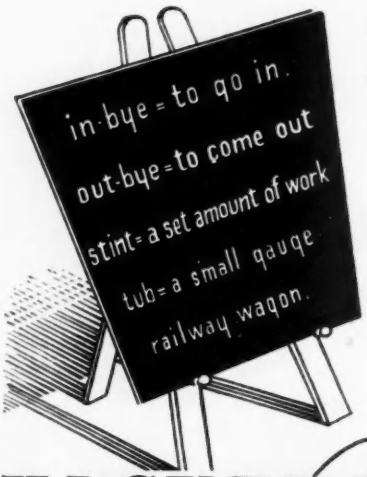

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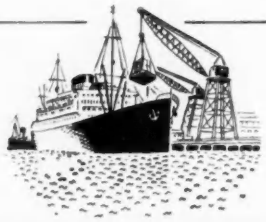

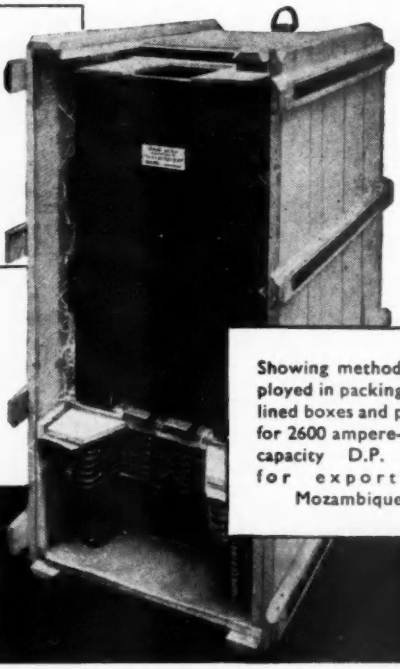

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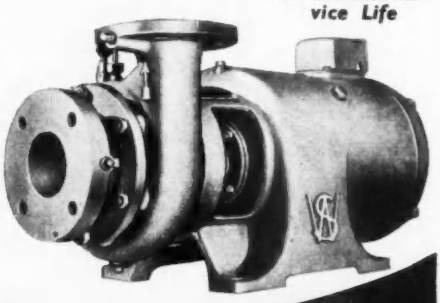

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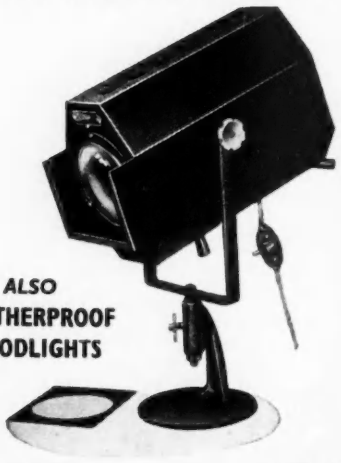

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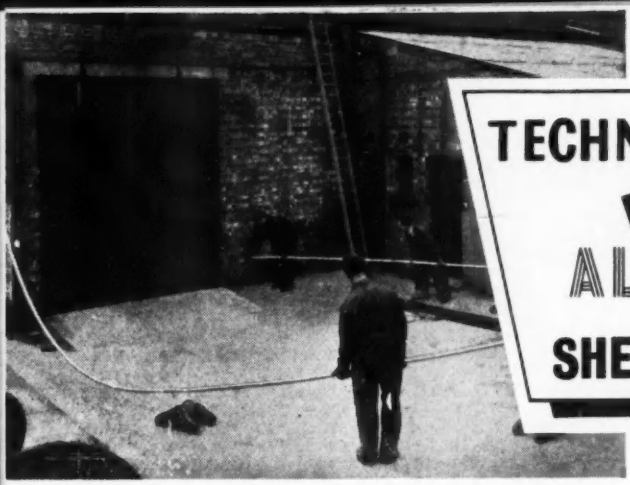

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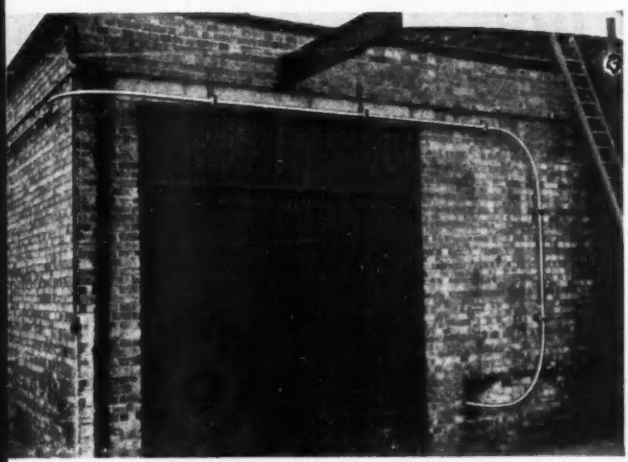

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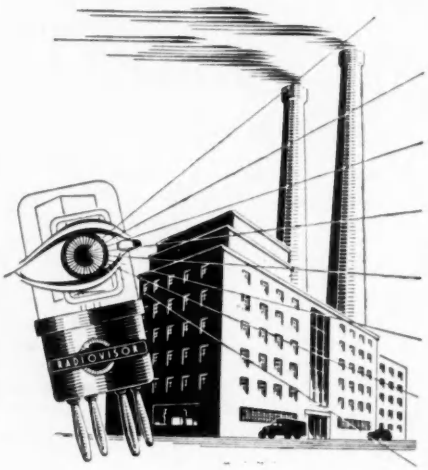

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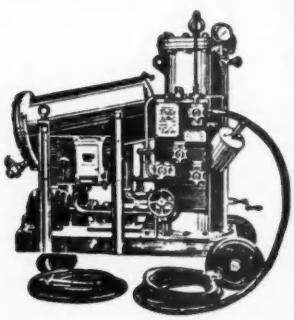

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ELECTRICAL TIMES

Vol. 119 No. 3091 THURSDAY, 1 FEBRUARY, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

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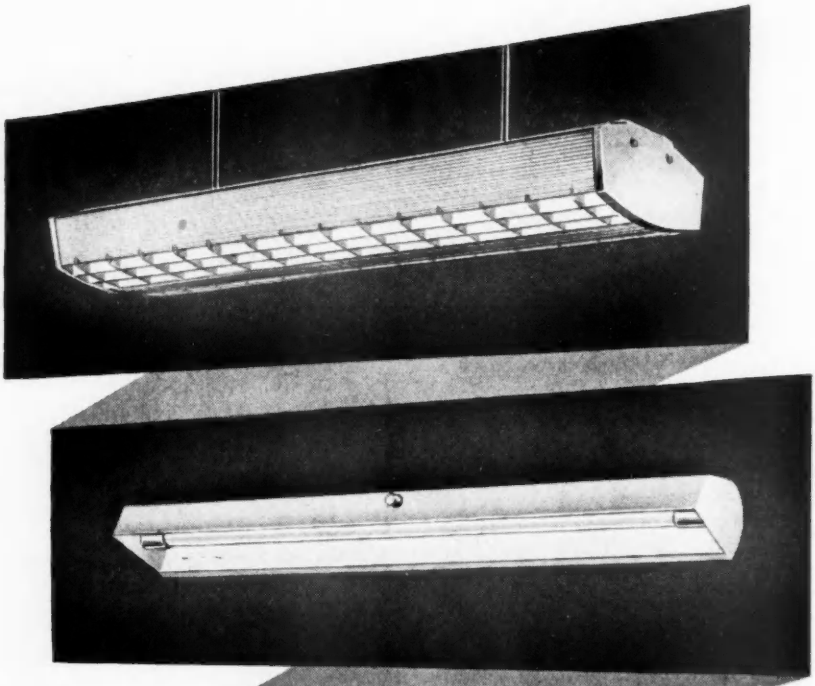

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Top: Decorative Louvre Pendant for 3—80 watt 5 ft. OSRAM Lamps.

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Editorial

SOLID FUEL SOLILOQUY

TWENTY years ago the electricity supply industry would have jumped to the attack on the recent Ministry of Health direction to local authorities requiring them to insist that all solid fuel appliances, including open fires, installed in new privately built houses should be of the same approved standard as those in council built houses. In contrast, today this is accepted without demur. The principal reason for this change of heart is the preoccupation of the supply industry with avoiding undue electrification, perhaps also, the advances in design of solid fuel appliances have levelled up the main arguments in favour of electricity. But in case we should ever return to those halycon days of unfettered competition, it may be wise to issue now a caveat against the too ready acceptance by the Ministry of recommendations from the Coal Utilisation Joint Council. Not that Meteor wishes to cast any doubts on the work of this important body, but merely to stress that these modern solid fuel appliances require a care in their installation and a knowledge of their characteristics which the bulk of the building industry at present lacks. Similarly, given the wrong kind of fuel, which not infrequently happens today, some of these approved fires can be more wasteful of coal than the ordinary open type.

ACT OF GRACE

IN deciding to extend for another four years the 1948 relaxation of the restriction on the use of supplementary generating plant in industry, the B.E.A. has taken the only equitable step possible. Both industry and the oil engine interests have been pressing hard for this concession, and in view of the present power position, it is obviously a national need that industry should be able to obtain at least a partial independence in electrical supply. It seems doubtful whether the year 1956 chosen for the termination of the relaxation has any particular significance and certainly the official announcement carefully avoids any statement that it is hoped the power shortage will by then be overcome. At least the industrialist is guaranteed four years additional usage of his plant, but even with this extension, the rate of depreciation on such plant must be high and the fact that it is willingly paid is significant of the great value industry places on continuity of supply.

TEE OR ⊢?

THE modified arrangement of ring main tee-off units was one of the most interesting points raised by Mr. McLean's I.E.E. paper reviewed elsewhere in this issue. By this, the conventional circuit-breaker with two wing isolators is connected so that the transformer is teed off through one of the isolators, while the ring circuit itself is taken through the breaker and the other isolator, instead of the transformer being teed off through the breaker. It is, however, well to bear in mind that such an arrangement, attractive though it seems, will mean considerable modification to most standard units. In the first place, discriminating protection will be required, otherwise nothing but sheer chance would determine the points at which the ring would be sectionalised. If pilot type protection is used, there is the problem of housing any special current transformers, and of inserting current transformers in one of the isolator circuits, while at the same time the convenience of instantaneous cable earthing and testing are no longer available on one side of the ring. Never-

theless, as Mr. Davies pointed out, this arrangement has been applied in Edinburgh and compared favourably with the conventional arrangement of unit and the addition of 3-point sectionalising of the ring. There is little doubt that the convenience in operation, eliminating hasty visits to many substations for the purpose of hand sectionalising, is a very great asset.

SELECTIVE HEATING

IT is seldom realised how selective are liquids and vapours in their reaction to any electromagnetic radiation that is incident upon them. We are used to a similar effect with colours, many lessons having been learned from the discontinuities of the fluorescent lamp spectrum. Now the behaviour of longer wavelengths, those within the "infra-red" range, are attracting the critical attention of electrical engineers. Thin layers of water, for instance, absorb radiant heat most strongly when it has a wavelength of 3 or 6 thousandths of a millimetre, and as Mr. Sharples shows in his paper which we report on another page, the normal "infra-red" lamp radiates most of its energy at frequencies outside this range. This is, indeed, no drawback in the normal application of the lamps to the drying of paint films on a solid surface, for the radiation can effectively heat the base material, and this in turn dries out the film by conduction. Where, on the other hand, a substance to be dried contains moisture throughout its mass, and has the power of diffusing it quickly to form a surface film, the selective frequency effect becomes of importance. The use of elements operating at a comparatively low temperature begins to have many advantages in terms of space, cost and operating time.

MICA BY THE YARD?

THE prospect of obtaining mica in continuous thin sheets is a very attractive one, and the results of French research to this end, reported elsewhere in this issue, will be read with interest by all concerned with insulation. While Samica, as it is called, seems a step in the right direction, it is by no means a complete answer to the problem since the material produced depends for its mechanical strength on waterproofing with varnish, thus losing one of mica's most valuable characteristics. Nevertheless, it might be possible, by the use of high-temperature resins of the silicone group, to produce a material which has heat-resisting qualities similar to those of pure mica. Lacking information on comparative costs, it is not possible to forecast the extent to which Samica will compete with micanite. Its most valuable feature would appear to be the ability to manufacture it from scrap which is too small to be usable for splittings.

Meteor

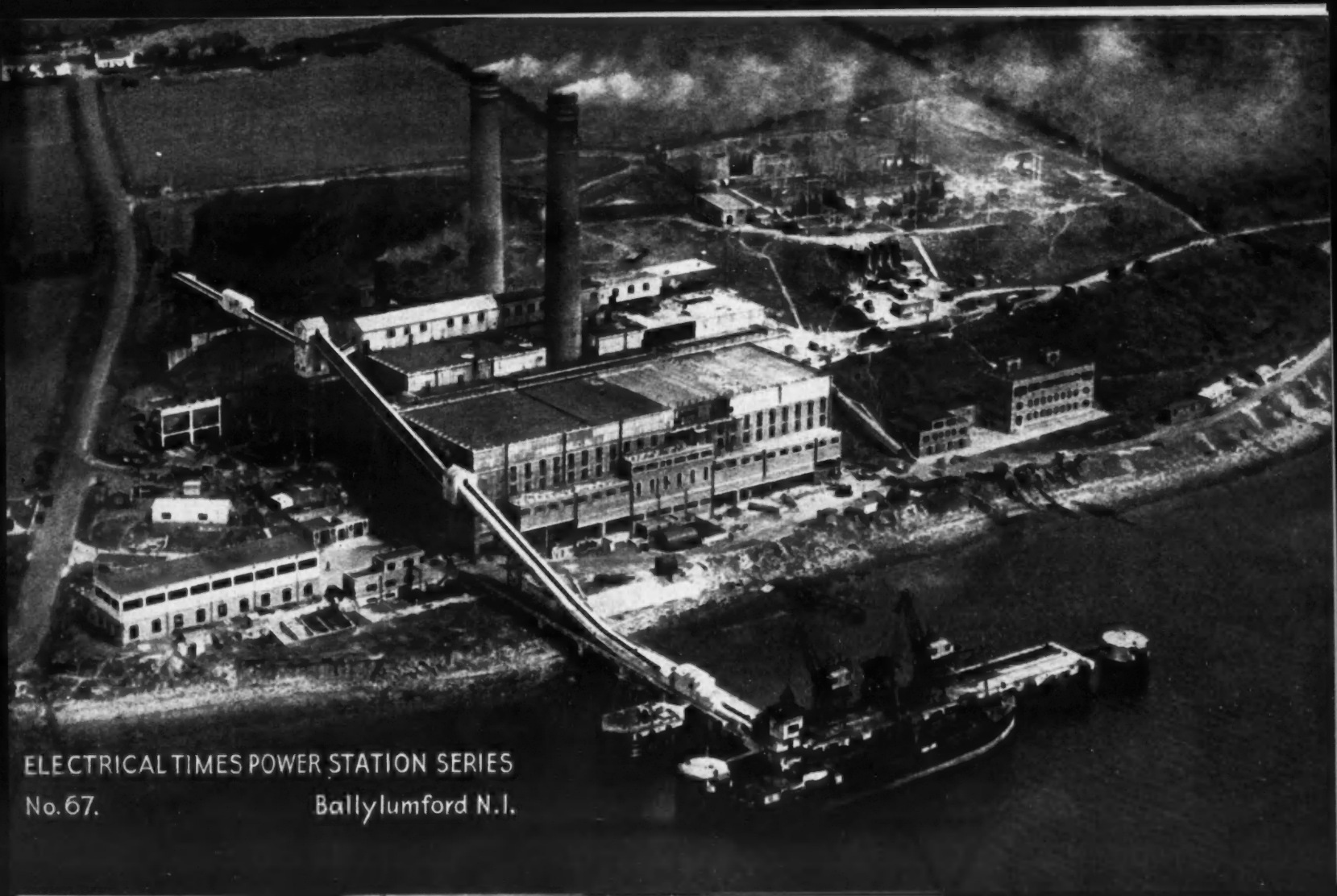
THIS WEEK'S PHOTO

BALLYLUMFORD power station, Islandmagee, County Antrim, is owned and operated by the Electricity Board for Northern Ireland. The initial section of the station was put into operation in January, 1943. The capacity of the plant at present in commission is 93,000 kW, comprising one 30,000 kW set generating at 33,000 V, 50 c/s, 3,000 r.p.m. with steam pressure 220 lb/sq in. gauge and temperature 780° F at turbine stop valve, and two 31,500 kW sets generating at 33,000 V, 50 c/s, 3,000 r.p.m. with steam pressure 600 lb/sq in. and 820° F at turbine stop valve. The boiler plant consists of two 150 klb/hr boilers, 240 lb/sq in. and 800° F at boiler stop valves and five 150 klb/hr boilers, 625 lb/sq. and in 835°F at boiler stop valves. A reducing valve capable of passing the capacity of one boiler between the high pressure range and the low pressure forms a standby to the low pressure boilers for the low pressure set. A fourth 31,500 kW set and two additional 150 klb/hr boilers, 625 lb/sq in. and 835° F, are nearing completion, to bring the station's capacity up to 124,500 kW, with one standby boiler.

Coal supplies are seaborne, delivered at the jetty by two 5-ton travelling cranes, with grabs for unloading colliers to two travelling feeder hoppers. Alternatively, coal can be delivered from the north end of the jetty to a fixed feeder hopper and thence to the rising conveyor.

Energy generated at 33 kV is stepped up to 110 kV for transmission to four step-down substations throughout the area and for interconnection with the other major power station at Belfast owned and operated by that Corporation. Supplies are also sent out direct at 33 kV to sections of the Board's north eastern area.

The total units exported from Ballylumford power station for the year ending December 31, 1950, were 336,353,990, with a maximum demand of 90,500 kW.


ELECTRICAL TIMES POWER STATION SERIES
No. 67.
Ballylumford N.I.

Electrical Methods of Carbonising Coal

Possibilities of an attractive off-peak load

By L. T. MINCHIN, B.Sc., M.Inst.GasE.

EVERY year some 45 million tons of coal are used by the gas works and coke ovens of this country. In every case, in spite of the superficial diversity of plant, the principle employed is the same; coal contained in a refractory retort is heated to about 1,000° C. by flames and hot gases conducted through flues in the brickwork surrounding the retort. In these flues the temperature must, of course, be higher than in the retorts; 1,100°-1,300° C. are common values, and the wear on the refractory bricks is a serious matter.

Electrical Advantages

It has often been pointed out that to try to push heat through walls, which must also be made strong enough to resist mechanical stresses, is essentially a wasteful and clumsy procedure. It is surprising that an efficiency of 87% can be obtained in this way, but any method of generating heat in the centre of the charge itself would evidently have great advantages. The direct heating of the charge by an electrical current would be one way of attaining this ideal, and the method is made more attractive still by the fact that coal in the semi-plastic condition, mid-way between coal and coke, is a much better conductor than coke. It follows from this that the current tends automatically to choose the path in which its heating effect is most needed.

The earliest practical plant was that erected at Detroit to the design of H. Stevens. It was an intermittent process, comprising a vertical cylinder which could be filled with coal except for a central core of crushed coke, serving as a fuse to start the operation. Alternating current was supplied at about 500 volts to start the process, but by the end only about 70 volts was needed. The central core first heated the adjacent layer of coal from which gas began to distill. At the same time the coal was changing to the plastic stage at which the electrical resistance was lowest, and the main current therefore soon began to pass through this tube-like zone of coal in preference to the central core. In time this tube of coal developed the fissures which are characteristic of coke, making the electrical resistance rise rapidly, so that the current passed through the next layer of coal. Ultimately, when the whole charge had been converted to coke, and all gas, oil and tar had been evolved, the retort could be cooled and emptied.

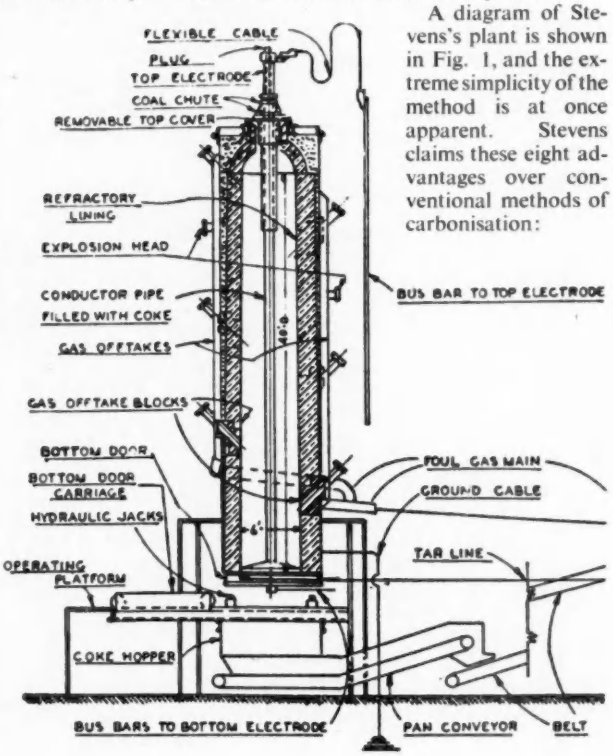


Fig. 1. Diagrammatic sketch of the 30-ton electric carbonising retort at Detroit

A diagram of Stevens's plant is shown in Fig. 1, and the extreme simplicity of the method is at once apparent. Stevens claims these eight advantages over conventional methods of carbonisation:

(1) The capital cost of the plant is very low. Since the heating comes from *inside*, quite a low grade of refractory lining is all that is necessary.

(2) Low labour costs.

(3) Small site area.

(4) Exceptionally high thermal efficiency; at least 95%.

(5) The electricity can be taken at whatever off-peak period is most convenient to the supply authority.

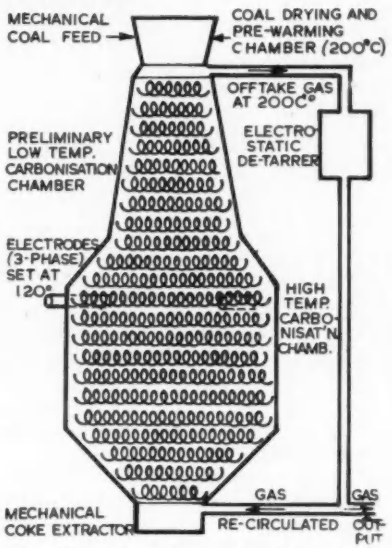


Fig. 2. Schematic of Norwegian plant. The coal represented by spirals in the drawing moves continuously downward being converted into coke during the process

(6) The process is remarkably flexible in operation. The rate of carbonisation can be varied between ½ in. and 6 in. per hour according to the voltage supplied. It can even be stopped entirely and resumed again when convenient.

(7) No contamination of gas with waste gases, therefore exceptionally low nitrogen content.

(8) The gas is unusually high in hydrocarbons, due to the fact that it does not come into contact with hot refractories.

It is not clear why Stevens' plant was closed down, but the second venture at Tennessee Valley was also not entirely successful, and only operated for five years from 1940-45. This was a continuous plant, the coal being fed in at the top and coke discharged from a water-sealed rotating grate at the bottom, but the coke produced was of poor quality. In the final model a 10 in. carbon rod projecting from the top cover formed one electrode and the whole lining of the retort was faced with carbon to form the other electrode. In these conditions the exact path of the current must have been a matter of variation from moment to moment, and much of the "coke" extracted seems to have missed the hot zone altogether.

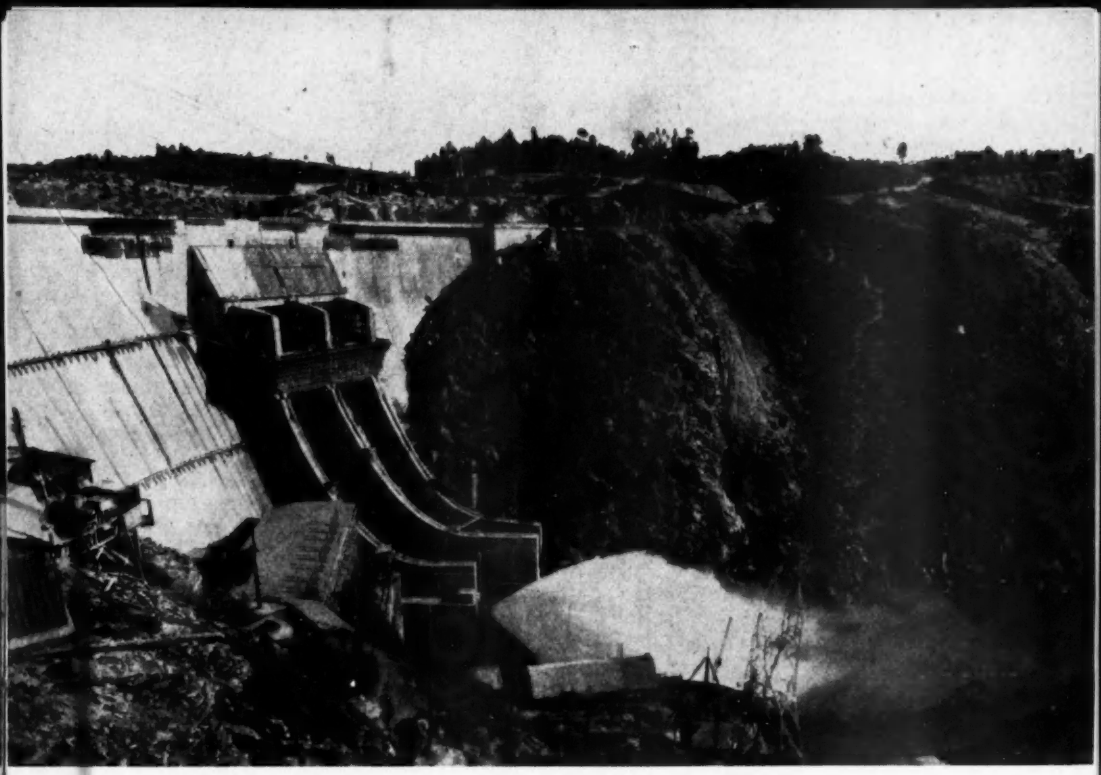
Norwegian Experience

Since the end of the war, Jensen, at the Norwegian Hydro-Electric Company has been making some interesting experiments, and a pilot plant is already in operation there. A 25-ton/day retort is proposed for the next stage, and ultimately the size will be increased to 125 tons. The general principles on which the Norwegian plant works are shown diagrammatically in Fig. 2. It is fed with 3-phase current at about 150 volts through three electrodes set at 120°. Gas driven off rises through the coal, imparting its heat to it and leaving the off-take pipe at about 200° C. A portion of the gas, after passing the electrostatic detarrer, is recirculated to the bottom of the retort in order to cool the coke before it is withdrawn at the base. The sensible heat of the coke is thus carried back to the carbonisation zone, and high thermal efficiency is obtained.

Possibilities for Britain

If Steven's claim of 95% is substantiated, the amount of coal ultimately used in the process (the current being generated therma'ly) would be slightly more than in conventional methods of carbonisation. However, Jensen, in Norway, now claims to be able to carbonise coal for 175 kWh/ton in his 25-ton retort, which represents an efficiency of something nearer 98%, so that in this case there would be a considerable saving of coal. Since the capital cost must be much less than that of the gas-making plant used at present, it would seem that electrical carbonisation should have great attractions for the gas industry, especially as a stand-by plant for peak loads or for use during repairs.

From the point of view of the electrical industry, a bulk load which can be taken during the night—say 10 p.m. to 6 a.m.—would have very great attractions, and the cost of such current cannot be reckoned solely in terms of the bare 21·33% overall average efficiency of electric generation. Evidently the thermal efficiency of generation depends on the load factor, and it might well be in the national interest to adopt a method of gas production which would improve the load factor at our power stations and so help to conserve our barely adequate fuel resources.



Castelo do Bode

First set goes into operation in Portugal's latest hydro-electric development

ON January 21, the President of the Republic of Portugal, Marshal Antonio Oscar de Fragoso Carmona, put into operation the first of the three turbo-alternators at Castelo do Bode Hydro-electric power station on the River Zezere, about 90 miles north-east of Lisbon. This station forms part of a comprehensive scheme for harnessing the hydro-power of an area particularly suited by geographical location for the generation of electricity. It is roughly in the centre of the country and distances to consuming centres are not excessive. Particular interest is attached to this scheme due to the large part played by British engineering concerns. Most of the equipment used in the constructional period such as cranes, concrete mixing and distribution plant, conveyors and cableways were provided by British firms and the electro-mechanical generating plant, lines and switchgear were entirely manufactured in this country.

General Considerations

The Zezere river, a tributary of the Tagus is located roughly in the centre of the country and has a comparatively gentle slope over the area under exploitation, the river naturally falling 264 metres over a distance of 137,000 metres. Owing to the irregular flow, a careful study was made by the Hidro-Electrica do Zezere organisation to consider the available storage and catchment areas. As the river flows for a considerable length between high banks, it was decided to utilise the maximum economic storage available by building four dams, each with their associated power station and storage facilities. These are, in the down stream direction, Cabril, with a dam height of 125 metres providing a total storage of 600 million cub. metres giving a working head of between 115 and 65 metres, with a maximum installed capacity of 146 MW; Bouca with a dam 65 ft. high, storage of 49 million cub. metres, working head 54 metres, capacity 90 MW; Castelo do Bode, dam height 115 metres, storage 1,070 million cub. metres, working head 95-53 metres, installed capacity 186 MW and Constancia with a dam 12 metres high, storage 5 million cub. metres, working head 7 metres and installed capacity 12 MW. Of these Castelo do Bode is to have the best load factor giving an annual output of 380 million units, compared

with 700 million units for all stations combined. For this reason, as well as the storage available behind the Castelo do Bode dam, work has been concentrated on this site.

Civil Engineering

The dam itself is a curved structure anchored at one side into the virgin rock of the gorge and buttressed at the other by a solid block of ferro-concrete, poured into foundations in the more gently sloping side of the valley. Prior to work being begun, extensive road-widening was carried out to enable easy access to be made to the site from the nearest railhead. In accordance with a government directive, as far as possible, local labour, materials, and Portuguese facilities were to be used in the constructional work. As the bed of the Zezere at this point is gravel, and granite is available in the immediate vicinity, concrete manufacturing equipment was set up on site, the gravel being removed from the river by drag line scrapers, transported to a washing and grading site and then returned to the concrete plant for mixing and distribution over the working area.

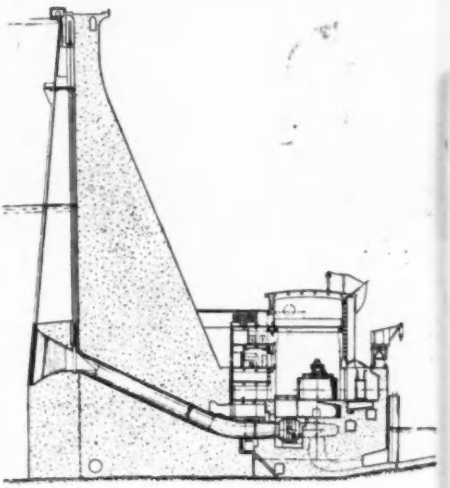
Two separate distribution schemes were used. The lower scheme, involving the dam foundations and the power station, was fed by two large cranes capable of supplying the whole area concerned, and the upper scheme using cableways strung across the gorge for transportation, was used for the top section.

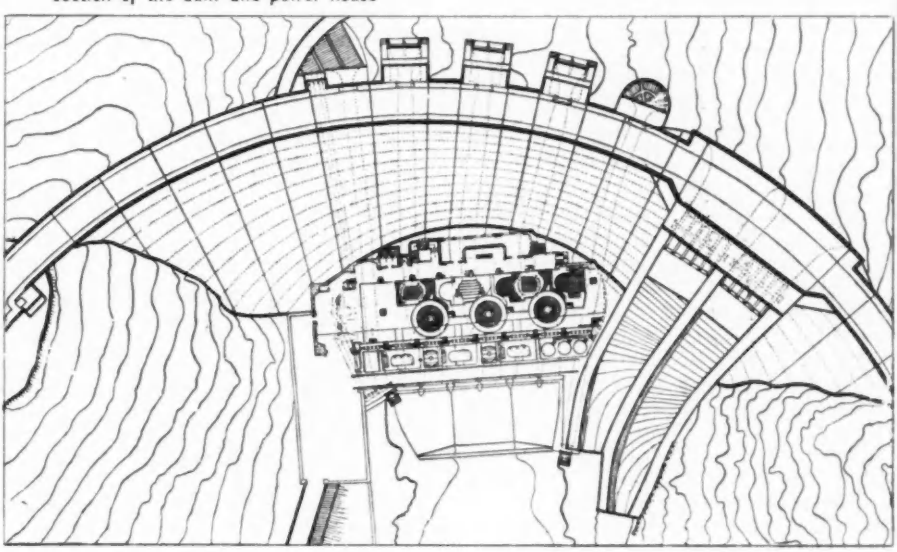
In order to enable the foundations to be excavated in the dry, a diversion channel was dug and the working area isolated by coffer dams.

The power station itself is located centrally with respect to the dam, the overflow sluices being to one side of it—the side selected being on the rock-anchored side.

Power Plant

Three firms—the English Electric Company, Metropolitan-Vickers and B.I. Callenders Cables—were responsible for the generating plant, switchgear and transmission lines. The





These two drawings show the plan and section of the dam and power house

Interior of the turbine room at Castelo do Bode during the constructional period

first two of these under a joint contract, are supplying the three generating sets. Each of these is a vertical shaft machine rated at 57,400 kVA, at 214 r.p.m., the water turbine being rated at 73,000 h.p. The voltage of generation is 15,500 volts, which will be stepped up to the main distribution voltage of 165 kV for feeding into the Portuguese Grid. Three transformers of 52·5 MVA capacity 15·5/165 kV, have been supplied as well as the 162 kV switchgear incorporating air-blast circuit breakers. The transformers are located in an annex to the power station on the downstream side and the power is then fed directly to the switching station.

Owing to the lack of power facilities on site, work on the transmission line from Castelo do Bode to Lisbon was begun well in advance of the general construction and a 66 kV connection feeding power from Lisbon to the site provided the necessary facilities for the operation of the heavy plant. This line, designed by B.I. Callenders Ltd., was subsequently used for the main transmission of power from the dam site back to Lisbon at 165 kV. In its construction over 1,800 tons of steel were used for the towers over the line route of 69 miles, and the actual conductor length consists of 300 miles of steel cored aluminium conductor.

The main interest in the scheme lies in the high degree of co-ordination achieved between the numerous contractors and organisations concerned. The civil work was undertaken by the Portuguese using local labour and materials, under the advice of French and Swiss engineers; the heavy equipment was supplied mainly by British firms, and the electrical and mechanical equipment also came from the same source. That such international complications can produce little difficulty can be gained from the fact that work on site did not begin until late 1946 and the first machine is now running.

I.E.E. Measurements Section Dinner

THE annual dinner of the I.E.E. Measurements Section, held last Tuesday at the Café Royal, Regent Street, was a most successful occasion, over 250 members and guests being present.

Dr. G. A. V. Sowter, Chairman of the Section, welcomed the guests, singling out for particular mention Sir Archibald Gill, President of the I.E.E., Sir Henry Self, representing the B.E.A., and the Chairmen of the other sections. He regretted the unfortunate absence of Mr. W. K. Brasher, Secretary of the I.E.E., due to illness.

Replying, Sir Archibald Gill, complimented the Section on the large attendance. It was, he said, the largest Section dinner he had yet seen. He pointed out that science was founded on measurement, and in that respect the section must be the most scientific in the Institution. In his own experience the few years he spent in the laboratory working on measurement was most interesting. He wished the Section every success and thanked them for their hospitality.

Sir Henry Self referred, in a most witty speech, to the difficulty of measurement. In more serious vein, he pointed out that although the economist had said that power production would never catch up with the demand, in 1950 we had installed three times as much plant as the average of 1946 and 1947 and next year it was hoped to obtain four to five times as much, providing outside forces did not interfere. The economist had suggested ripple control for control of the peak demand. If there was any way of doing this the Measurement Section could give the answers.

Mr. F. J. Lane, Vice Chairman of the Section, proposed the health of Dr. Sowter, who briefly replied, thanking the Committee, the Members and Mr. H. V. Steele, Secretary of the Section, for their support.

Our readers' views . . .

Troubles and Remedies

I HAVE read with great interest the comments by Mr. G. L. Cole in your issue of the Jan. 18, regarding my remarks on the melting point of grease for ball and roller bearings. While I do not consider myself qualified to argue with a specialist on the chemical structure and characteristics of lubricating greases, I would venture to offer the opinion that the criticism of the use of the term "melting-point" in connection with lubricating greases will come as a surprise to maintenance and other engineers, who, like myself, have always regarded it as an important factor in determining the suitability of grease for the lubrication of bearings.

We have been given to understand that such greases consist of solutions of certain soaps in mineral oils, with a small percentage of water and other matter, and that satisfactory lubrication of the bearing cage etc. depends upon the *slow* release of oil (without separation of the soap base). It has consequently been assumed that the rate of release of the oil is dependent on the melting-point; too high a melting-point preventing sufficient release of oil, whilst too low a melting-point will result in the grease breaking down into its separate constituents of oil and soap, under which conditions the oil will leak away leaving the hard non-lubricating base. In the latter eventuality, it is usual to find large quantities of brass dust on the surface of hard grease adjacent to the cage.

It is quite common for makers and engineers to recommend the use of a "high melting-point" grease for bearings operating in a high ambient temperature, whilst conversely it is assumed that bearings operating in abnormally low ambient temperatures, will require relatively low melting-point grease. If, therefore, we are now to dispense with the term "melting-point," I think the grease manufacturers should give us an alternative standard whereby, we can measure our requirements.

I quite agree of course, that where the grade of grease is under suspicion, the motor maker, bearing maker or lubricant maker should be consulted in the first instance and, I can only plead as an excuse for this omission the essential brevity of the tables. I thank Mr. Cole for giving me this opportunity to amplify my remarks on the point at issue and I would suggest the following amendment of the quoted remedy :—

"Replace by suitable grade, recommended by the makers after due consideration of the normal operating temperature conditions."

S. Spence

TIMPERLEY, CHESHIRE. B.Sc.

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"The Consumer's Fuses"

"MEGOHM," in his article in the issue of the ELECTRICAL TIMES of January 11, raises some interesting points, and one cannot but agree that some measure of uniformity in connection with supply intake arrangements is desirable.

As a start, however, might one suggest that "Megohm" sets his own house in order by standardising on terminology? Within a few lines of his article he refers to "high tension," "medium voltage," and "standard pressure." The words "tension" and "pressure" as synonyms for "voltage" do not appear in British Standard 205, 1943, Glossary of Terms Used in Electrical Engineering, and furthermore, in the same British Standard the use of the terms "low voltage," "medium voltage" and "high voltage" is deprecated for ordinary practical usage, but they are retained within the Glossary on account of their inclusion in various Acts and Orders.

The Electricity Supply Regulations, 1937, define "voltage," but do not make use of "pressure" or "tension." The Electricity (Factories Act) Special Regulations, 1908 and 1944, define "pressure," "low pressure," "medium pressure," "high pressure" and "extra-high pressure," but these Regulations were originally drafted in 1908 and do not appear to have been revised having regard to modern British Standard.

In connection with the installation "Megohm" describes in his article, it would appear that the whole of the consumer's installation was designed and installed without prior reference to the supply authority. This in itself was unwise, as often by early discussions "clean" layouts can be easily arranged by the supply authority and the consumer's contractor, thus avoiding the tangle of V.I.R. with which we are all so familiar.

"Megohm" says that in this particular

instance he failed to convince the mains engineer that the standard method of terminating the service cable in a fusible cut-out was out of date, but he should refer to the Electricity Supply Regulations, 1937, Regulation 24, which says that "a suitable fusible cut-out or automatic circuit-breaker of adequate rupturing capacity completely enclosed in a suitable locked or sealed receptacle of solid fire-resisting construction shall be inserted by the undertaker in every service line as close as practicable to the supply terminals." Clearly, if the undertaker has to be responsible for complying with this condition, he should specify and supply the fusible cut-out, but there is, of course, no reason why it should not be mounted in close proximity to the consumer's main switch. In this instance I suggest the consumer could well have dispensed with main fuses and not the supply authority.

One final point is that to design an installation for an estimated maximum normal load of 300 amp. and provision for future extension assumes an available capacity of low voltage main in the vicinity which, in many instances, would certainly not be justified, and consumers with a prospective load of this magnitude could expect a request to provide suitable accommodation for transforming equipment so that the supply could be given from one of the higher voltage systems.

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CINEMA WIRING RULES

NEW regulations governing electrical installations in cinemas come into operation today under the provisions of Statutory Instrument 1950 No. 2133. Existing installations, provided that they meet the requirements of the new regulations in certain respects, need not be brought into full compliance until January 1, 1953.

In general, cinemas are required to be so wired as to satisfy the I.E.E. regulations. Main transforming plant and switchgear for electrical supply to the premises is not covered by the S.I., except in so far as they are required to be placed in separate enclosures which communicate directly neither with the auditorium, nor with any exit leading from the auditorium to the outside of the building.

Requirements for main switchgear where the supply voltage is 650 V or above include the provision of metal-clad hand-operated circuit-breakers having over-current protection on all live poles, or else of linked fuse-switches. The usual over-current protection requirements apply to all main and sub-circuits, with the addition that, where the maximum earth fault current may be insufficient to operate fuses, etc., special earth leakage protection must be provided.

Wiring throughout the installation must be carried out with heavy gauge solid-drawn or welded screwed steel conduit, or some other hard metal sheathing. Rubber or lead covered cable alone, or in capping and casing is inadmissible.

For all groups of luminous discharge tubes with a rating of over 500 VA, provision must be made for automatic disconnection from the mains in the case of short circuit or leakage in excess of 20% full load current, unless normal methods of excess current protection can be provided. Control apparatus for such lamps must not be placed in the space between a ceiling and the floorboards above.

Film Rooms

Special requirements apply to rooms where film is handled. In the rewinding room, all metal in machinery used for rewinding must be bonded and earthed to avoid trouble from static electricity. In the projection room itself, transformers have to be double-wound, and a limit of 20 kVA is placed on individual units of converting equipment. Guards on such apparatus must be so placed that their surface temperature does not exceed 212° F. The voltage of any d.c. circuits installed after February 1, 1950 for the excitation of loudspeakers must not exceed 250 V.

The regulations make certain provisions for the use of television receivers in cinemas. These include a limit on the applied voltage to 150 kV, and on fault currents on h.v. circuits to 1 amp. Automatic disconnection from the supply must take place if there is a short circuit or current leakage exceeding 100% of normal full load current.

Apparatus for transforming up the voltage to a value greater than 650 V must not be placed in the auditorium, projection room or rewinding room. Television projectors must run with a casing temperature not exceeding 140° F., and be screened so that X ray radiation is less than 0·5 Rontgen units in 70 hours operation.

DISTRIBUTION SYSTEM PLANNING

Stimulating Discussion at the I.E.E.

"THE Planning of an Electricity Board's Distribution System" read by MR. G. O. MCLEAN, M.ENG., M.I.E.E., before the Supply Section of the Institution of Electrical Engineers on Wednesday of last week, was written with the purpose of stimulating discussion and dealt with the methods followed by the South-Western Electricity Board.

Load Surveys

The importance of forecasting load as accurately as possible can hardly be overstressed. It is not considered sufficient to extrapolate aggregate loads for 15 to 20 years, the method favoured being to analyse each of the independent variables—domestic, commercial, farming, industrial, and public lighting, each of which has different characteristics. In the case of the domestic load, for example, the population and, therefore, the numbers of families are first obtained by extrapolating from existing statistics, after which the probable number of consumers can be estimated, when assumptions are made of the probable saturation. Bearing in mind that most new building work is taking place within reasonable distance of existing mains, it is not considered over-optimistic to take a 97% saturation figure for 1965.

The next task is to determine a consumer demand figure, to determine standard service sizes, and local and area after-diversity demands to determine distributors and transformer sizes, and primary network loads, respectively. The figure chosen for consumer demand may have far-reaching consequences, on account of the number of consumers involved (no Board has less than 300,000), and setting the figure too high may involve large expenditures many years too early. Too low a figure, on the other hand, will involve much strengthening of networks and changing of transformers later on, causing excessive expenditure and dislocation, and may discourage development. Work carried out by Schiller and others has shown that 2 kW per consumer may be possible with high saturation factor for major appliances. It is, however, considered that development will follow the curve for autocatalytic growth—one which begins slowly then grows rapidly and commences to tail off after about 75% saturation. Fig. 1 shows such a curve, upon which have been superimposed to suitable scales, units

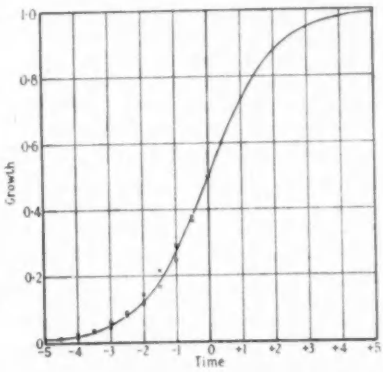


Fig. 1.—Graph of units sold on a time basis compared with $y = 1/(1 + e^{-x})$.
× × × South Western Electricity Board (1920–50).
○○○ United States (1905–50).

sold in the S.W. Board (1920-50) and the U.S. (1905-50). Use of all these aids to forecasting indicates a probable demand of 1·38 kW per consumer.

Each consumer group presents its own problems and it must be borne in mind that all estimates are estimates only, and close watch is necessary on how estimates and trends coincide, and figures must be revised annually.

Network Planning

Locations of loads are plotted using the 10 km squares of the Ordnance Survey map as locating units. This, overlaid with a transparency of the primary network, shows up deficiencies of transforming plant and primary transmission lines. Discussion with the Division on plans for future generating stations will show whether present supply points are suitably located.

After comprehensive load studies it was decided to standardise on 33 kV for the primary network, and this will embody steel towers, suspension insulators and copper conductors. Except at Bristol, 500 MVA circuit

breakers will be standard at supply points, reactors being inserted where fault energy is higher than this. Secondary h.v. network problems are complicated by the multiplicity of existing systems in use at different voltages and phase relationship, and 11 kV has been adopted as the standard.

There is a good deal of scope for standardisation of cable sizes and transformer capacities since the existing undertakings aggregated 36 types and sizes of 11 kV cable and 197 types and rating of distribution transformer. These have now been reduced to eight types of cable (excluding pilots) while transformers have been rationalised to five (pole mounting), eight ground mounting (outdoor), and three (indoor). Overhead line conductors have also been reduced to four sizes.

Substations are outdoor when possible and brick-built in urban areas, transformers being placed outside whenever possible, conservators being a standard feature. Single phase lines are being used for spur lines whenever possible and the phase/neutral system is under experiment.

Investigation has been made into comparative costs of utilising an 11 kV network or utilising 33 kV direct, and it appeared that the latter would be more expensive.

A standard having already been laid down for consumers voltage, it was only necessary to arrange a programme to carry this out as soon as possible. Other problems concern the rationalisation of sizes of distributors and service lines, types of pillars and connecting boxes, and consumers switch and fuse gear. To meet the growing load transformers are installed with a rating of about 25-30% above present load, with facilities for adding a second when the load reaches 10% above the first transformer rating. Standard sizes of 50 and 100 kVA for rural areas and 250 and 500 kVA for urban use are considered suitable. Rupturing capacity of 11 kV gear has been set at 250 MVA.

There is, it is felt, a very strong case for the Swedish view that transformers, being inherently reliable, can be considered part of the secondary network and protection transferred to the l.v. side in the shape of an air circuit breaker with reverse current tripping, as well as overcurrent. A ring main unit on the 11 kV side can then be used with the breaker in the ring circuit and the transformer fed through an isolator.

Service costs are a heavy item, and may be £50 per consumer. With an average return of £8 10s. per annum it is clear that every effort should be made to keep service costs low. Multiple services from one joint, and burying distributors close to houses instead of under the pavement are two proposed solutions, the latter saving as much as 7½ miles of service cable for a 1,000 house estate. The modern consumers service unit is too costly, and it is suggested that Boards should supply a simple moulded case with one h.v.c. fuse and neutral link, for the cable termination.

The remaining sections of the paper covered budgeting and financial matters, acknowledgments, and an appendix containing comparative costs of 33 kV and 33/11 kV distribution.

DISCUSSION

MR. H. NIMMO (Southern Electricity Board), who opened the discussion, said that while he was in favour of forward planning, 20 years was too long. In view of the present uncertainties, such as potential demands that never accrued and unexpected loads which could not be foreseen far ahead, 10 years with an annual revision would be sufficient. He expressed surprise that in a very thin area such as the South-Western the author recommended steel towers and suspension insulators, and should have thought wood poles would be sufficient for 33 kV. It was, he considered, an unnecessary expense to start with a 0·05 conductor, omitting 0·0225 which was a standard size, included in B.S. 1320. He also considered a conservator as a standard fitting on 11 kV transformers was unnecessarily extravagant. With regard to brick substations, he suggested that the supply industry should educate planning people to think in terms of outdoor substations in rural and semi-rural areas and asked why amenities should be spoilt by putting the transformer outside a brick building when it might be more usefully employed inside, keeping the substation warm. In this paper it was obvious that there had been a struggle between engineering and economic instincts, and he was inclined to feel that the author's engineering instincts had won.

MR. G. F. PEIRSON (Midland Electricity Board) said that the load maps referred to had been of considerable help in the Midlands. The low voltage distribution schemes had been planned on the basis of an ultimate provision of 2·5 kW per consumer, but in the initial stages it was down to 1·5 kW. The difficulty in laying low voltage conductors in front of houses was partly when tenants tried to dig their gardens and put in fence posts and chicken runs and partly when the local authority demanded public lighting and the post office wanted kiosks on the estate and one had to dig up the tenants' gardens.

MR. N. G. SIMPSON (British Insulated Callender's Construction Co., Ltd.) drew attention to the

importance in preparing the original design of allowing for the possibility of conversion in, say, 10 years time from 33 to 66 kV and an increase in the size of the conductor by the use of different material. He pointed out that the supply industry as compared with commercial undertakings with their rise and fall of turnover was in the happy position of having a steady rise in demand. This condition of stability, as it might be called, brought with it many responsibilities and obligations, such as the obligation to carry out research. He hoped the author would not make a closed shop of his experiments but would obtain the full co-operation of manufacturers. He underlined the advantage to manufacturers of being able to point out to customers abroad that equipment had been well tested in this country and that there was full information available about its operation.

MR. G. V. HARRAP (South-Eastern Electricity Board), speaking from the operating point of view, emphasised the importance of large-size cables and said that they had had enough of small cables.

MR. R. H. ABELL (Southern Electricity Board) said that the standardisation of 500 MVA switchgear would seriously limit the scope of the engineer; 350 was still used at many bulk supply points, and in some cases 750 could not be avoided. In the latter case he recommended consideration of the three-transformer method.

MR. E. J. DAVIES (Kennedy and Donkin) said the arrangement shown in the line diagram of distribution substation (Fig. 6) had been adopted successfully in Edinburgh. It was a surprising fact that this novel arrangement of a ring-main unit with pilots linked to protective gear could be used just as cheaply as a normal ring sectionalised in three parts, and the arrangement was better.

MR. C. R. WEBB, referring to the statement that the cost of low voltage distribution amounted to about £50 per domestic consumer and £100 per kW of maximum demand, pointed out that there was no one system of distribution which was economic for every load density. There were four types of load—rural, semi-urban or small town, urban or metropolitan, and heavy industrial. Economic studies showed that the only economic system at the present time was the interconnected low tension network system fed by a series of feeder transformers radial the whole way. There might be any number of transformers. There were many ways of applying this system, and he agreed with the author that a high tension breaker was not necessary to a transformer. The transformer was the most reliable piece of apparatus on a distribution system: it should not be parted from the cables except by some such means as an isolator. The system cut down not only on switchgear but on cable size (copper), which was the biggest item of cost.

MR. C. H. E. RIDPATH (Aluminium Wire and Cable Co.) expressed surprise at the omission of any reference to steel-cored aluminium which compared favourably in price with other conductors.

MR. H. J. SHEPPARD (London Electricity Board) suggested that the appropriate B.S. Committee might consider the nomenclature of distribution systems. He also drew attention to the advantage of dividing an area along natural and other obstacles to distribution, such as rivers, railways and permanent open spaces, instead of geographically.

MR. A. N. D. KERR said Mr. Webb had been responsible for a scheme of the kind he had described. A team had, however, crossed the Atlantic and returned very jubilant about the success of such a scheme in America when it might have gone a few miles to Hackney. He drew attention to the inequity involved when consumers were asked to pay a capital sum down because the cost of providing the supply was felt to be disproportionate to the revenue (a reasonable request) while other consumers coming on the supply later made no contribution. He suggested consideration of the merits of a rental which might be an admissible trade expenditure and be allowed in the appropriate schedule of rateable value assessments for domestic consumers.

LT.-COL. C. WALEY-COHEN feared the author had to some extent caught the disease of the Generating Section of the B.E.A.—timidity. Had they not suffered from that disease there might have been no cuts and shedding, but they had been afraid of being too optimistic. It was his experience, he said, that 1·3 kW per consumer was much too low. He also expressed the view that one of the great dangers of the area board set-up was the tendency to have no development fund. This situation should be remedied.

MR. L. H. FULLER considered that conservators were an unnecessary expense on outdoor transformers. He expressed the hope that efforts to improve the amenities would not result in too high a surcharge on buildings, which were not necessary in the first place. The outdoor type of substation for 11 kV and 6·6 kV switchgear had been successfully used.

MR. F. S. NAYLOR thought the author should have justified his proposals in terms of prospective revenue as compared with capital expenditure. He drew attention to the demand from critics on all sides to stop further sales development and suggested that if development must stop the supply industry must stop spending capital. Planners should maintain the correct balance between the capital cost of their plans and the anticipated units and revenue.

MR. J. W. PERKINS thought that one aspect of the economics of a well-planned distribution system tended to be forgotten. He referred to standardisation of such a nature as to enable manufacturers to produce large quantities of components at reduced prices.

MR. G. O. MCLEAN made suitable reply to many of the points raised.

Manufactured Mica

Research on Continuous Sheet Production

RESEARCH work in France on the production of continuous sheets of mica are described in the December issue of the *Revue Generale d'Electricite*, in which the authors, M. Henri George (Director-General of the Societe Quartz et Silice) and M. Louis Metzger (President-Director, Usines Dielectriques de Delle) describe the application of paper-making technique to the process.

During research on manufacturing of mica powders as far back as 1939, the late M. Jaques Bardet had established that certain micas submitted to appropriate thermal and chemical treatment did not yield a powder after filtration and drying but a coherent leaf or sheet. Pressure of other work prevented further results until about 1943.

Process

The actual process as carried out at the Valdoie works of the Usines des Dielectriques de Delle utilises muscovy mica in the form of mine refuse, which is first heated to drain off a part of the water of crystallisation. The temperature and duration varies with the type and source of the mica, there being a well-defined optimum temperature for each grade, a period of 20 minutes at 800° C. being typical. This modifies the natural crystals and the mica swells slightly. This heat treatment is an essential part of the process and requires considerable care, since it is not an easy matter to raise a mass of mica to a uniform temperature. The hot mica is then treated with a solution of sodium carbonate. Local effervescence drives out the air contained between the flakes. After cooling, the mica is in the form of small stacks of laminations of low cohesion, which retain a large quantity of solution. The flakes are then separated by the use of an acid which releases CO_2 in considerable quantities and swells the stacks out to something like a thousand times the original thickness. Light agitation then separates the flakes, giving a pulp which feels quite slippery. Filtering of a suspension of this pulp in water gives a film formed of a multitude of tiny flakes cohering loosely. This process can be carried out on a continuous basis by paper-making machinery modified to suit the heavier suspended particles and slower drainage of the water.

Propert'es

The "samica" sheet obtained is about half the thickness of natural mica, due to the absence of air between the flakes, but the bulking of the material varies according to the source of the mica and the treatment. Tensile strengths of several kg/sq mm can be obtained. As obtained, however, the sheet will not withstand moisture, and if placed in water, will return almost instantaneously to a pulp. It can, however, be mixed during production with a polymerising material (such as melamine), in which case its water-resistance is considerably increased.

Applications

Uses foreseen for this material seem to be in the direction of mouldings and micanite-type materials, its particular advantage lying in its uniformity of thickness as against micanite unless the latter is made with larger splittings, which increases the cost considerably. Micanite sheets cannot be made, it is stated, to a tolerance of 0·03 mm. without correction and filling-up of thin spots, whereas Samicanite sheets (impregnated and press-finished, using bakelised-paper techniques) leave the press within the prescribed tolerances.

The results of 2,000 comparative tests on sheets approximately 100 × 50 cm and 0·7 mm thick showed that, with micanite, 95% had a breakdown less than 15 kV, 50% less than 8 kV, and 2% less than 4 kV. The Samicanite, on the other hand, gave results better than 15 kV in 95% of the cases.

For use in commutators, Samicanite is stated to have longer life, equal elasticity, higher resistance to compression, and better stamping properties, the breakdown in kV being given as 12 kV for 0·2 mm thickness, to 34 kV for 1 mm thickness, with compression of about 6% at 600 kg/sq cm at 250° C.

Similar advantages are claimed for Samicafolium, comparative properties being as shown in Table 1.

TABLE I. COMPARISONS OF YELLOW AND BLACK MICAFOLIUM AND SAMICAFOLIUM

	Micafolium		Samicafolium	
	Y	B	Y	B
Thickness (mm.)	0·17-0·23	0·18-0·23	0·15-0·17	0·15-0·17
Mica content %	45-50	50-55	45-50	50 55
Dielectric strength (kV/mm)	17-25	22-29	24-27	24-27
Tensile strength kg/sq cm	3-4	5-8	4-5	4·5-5
Loss factor at 50 mc/s, 4 kV/mm				
20° C	0·04-0·05	0·03-0·08	0·03-0·04	0·02-0·03
100° C	0·25-0·40	0·15-0·25	0·17-0·25	0·08-0·12

Problems and Practice

IN ENGINEERING

Dynamo Rotation

THESE notes are intended to assist those who experience difficulty in deciding what is necessary when reversing the direction of rotation of a dynamo. In the diagrams of a two-pole compound machine with inter-poles the magnetic polarity, marked with arrows, is assumed, for clarity, to be the same as the direction of current flow through the coils, the polarity of residual magnetism being shown dotted in each case.

The essential conditions for operation of a dynamo are: (1) the field current should create a magnetic field of the same polarity as the residual magnetism; (2) each inter-pole should have the same polarity as the next main pole forward in the direction of rotation; and (3) in a cumulative compound dynamo, which is the usual arrangement, the series and shunt fields should have the same polarity.

If the direction of rotation is reversed the slight armature voltage generated due to the residual magnetism will be of opposite polarity to normal and, if the connections have not been changed, the current passed through the field coils will tend to de-magnetise the poles and prevent the voltage building up. In order to satisfy condition (1) it is necessary that the shunt field coil connections be reversed, when the dynamo will build up with reversed terminal polarity; the direction of current flow through the shunt coils being normal. To satisfy condition (3) the connections of the series field coils must also be reversed as in Fig. (b). The connections to the inter-pole coils can be left unchanged, as reversed rotation and reversed polarity of current through these coils automatically satisfies condition (2). On some machines the terminals and links are so arranged that these changes can easily be made.

Another method of providing for the reversed rotation is to reverse the connections to the brushes and also to the inter-pole coils as in Fig. (c); this method gives the same terminal polarity as before and may be useful in some instances. If the leads to the brushgear are long and fairly flexible it may be possible to move the whole brushgear round by the amount of the brush pitch, which is equivalent to reversal of brushgear connections. From Figs. (b) and (c) it will be seen that the essential conditions for reversed rotation are that the actual direction of current flow through the series and shunt coils shall be unchanged, and the direction of current flow through the inter-pole coils shall be reversed, however these conditions are attained. In a plain shunt or series dynamo or one without inter-poles, the same considerations apply.

In the case of, say, a motor which has been put to work as a dynamo it is best to test the actual polarity of the coils. The residual magnetic polarity can easily be found by means of a compass needle when the dynamo is at rest. To test the polarity of the shunt coils of a compound dynamo the compass needle can be used when the dynamo is running unloaded, and the compass needle will indicate the polarity of the inter-poles when the dynamo is working on load. The polarity of the series

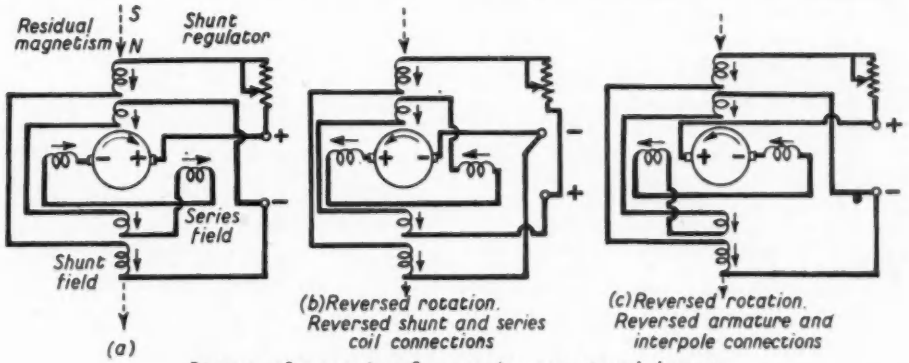


Diagram of connections for reversing a compound dynamo

field coils can best be found by disconnecting the shunt field coils and running the dynamo on load as a series machine, using the compass needle as before. Another method of ascertaining whether the shunt and series fields have the same polarity is to check the armature voltage when the dynamo is run on a certain load. Then short-circuit or disconnect the series field coils and again test the armature voltage on the same load. If the armature voltage is now greater than before the shunt and series fields are in opposition. The shunt coils are correctly connected if the dynamo builds up on no load and hence the connections to the series field coils need reversing for cumulative compound connections.

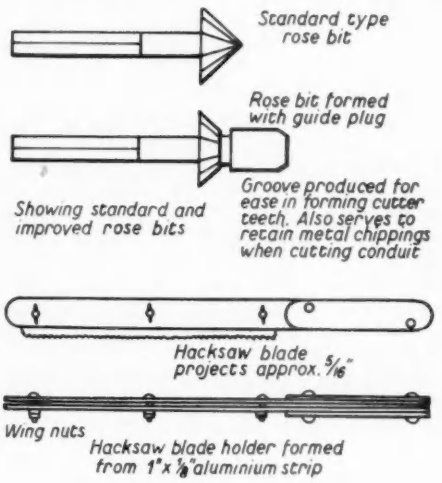
As far as commutation is concerned, the brush position for an inter-pole dynamo will require little or no change. For a dynamo without inter-poles the best brush position is usually slightly advanced in the direction of rotation, and the brush position will then require alteration when the dynamo rotation is reversed. Also on certain machines having brushes which are not set radial to the commutator, it may be advisable to reverse the brush holders to obtain smooth running of the commutator under the brushes.—"*Electricus.*"

Handling Conduit

THE standard type rose bit, as used in a carpenter's brace, for removing burrs and bevelling out conduit ends, is not very satisfactory. In use, the brace rocks about, and the bit often cuts on one side of the conduit and leaves a sharp edge on the opposite side. Even if cutting true, the operator usually has to make several inspections of the conduit end before he is satisfied.

An improved rose bit, as illustrated, was turned from a piece of silver steel bar. The cutting teeth were formed by setting over the top slide of the tool rest and using a suitably ground tool as a drift. After completion, the tool was hardened and tempered. It will be appreciated that a separate rose bit will be required for each size of conduit, but the speed and accuracy of the resultant bevelling will justify the trouble.

The common practice of cutting straight through conduit by means of a hacksaw results in the breakage of many good blades. Breakage nearly always occurs when the blade is about half-way through, as at this point it is cutting directly across the conduit walls. Using hacksaw blades with more teeth to the inch is one remedy, but results in slow cutting. A more satisfactory way is to make up from aluminium strip a frame, as illustrated. Such a frame gives full support to the blade, controls the depth to which it can cut, and renders the blade almost unbreakable. Granted, a little more wrist work is necessary when using such a frame, but freedom from blade breakages represents a very real saving in time and money.


Standard type rose bit
Rose bit formed with guide plug
Showing standard and improved rose bits
Groove produced for ease in forming cutter teeth. Also serves to retain metal chippings when cutting conduit
Hacksaw blade projects approx. 5/16"
Wing nuts
Hacksaw blade holder formed from 1"x 1/8" aluminium strip

Conduit tool details

Every wireman seems to have his pet form of fish-wire. Good results have been obtained from a fish-wire made from heavy stranded steel wire as used for motor cycle clutch control, having a small brass or steel ball soldered on one end, and the other end looped back for approximately 1½ in., wire bound and soldered.—*F. S.*

Beware of Replacements

A FAULT developed on a 30 h.p. motor which was controlled by the usual star-delta starter. On inspection it was found to have burnt out. A replacement of exactly the same pattern was, however, available. It was then wired up the same and a final check-up was made with a wiring diagram.

On trying to start the motor, however, it was found that the starting handle would not hold in the "run" position. Another check-up was made with the diagram, but still everything seemed in order.

As an experiment, two of the mesh connections were changed over.

The motor was tried again and ran perfectly and the starter held in. The replacement was, of course, wired wrong, two of the connections being crossed. A moral is attached to this account—never take anything for granted.—*M. R. J. N.*

Showroom Style in Scotland

Scott's new centre in Sauchiehall St., Glasgow, shows bold approach to electrical sales and service

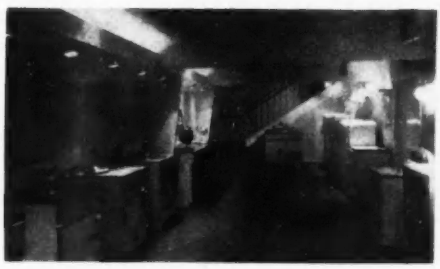
DESIGNED to draw the critical attention of the Scot and proving quite an eye-opener for the "Sassenach" too, is the new retail all-electric showroom opened by James Scott and Co. (Electrical Engineers, Ltd.) at 426 Sauchiehall Street, Glasgow.

Following current trends in shop front construction, the architect, A. B. CAMPBELL, D.A., A.R.I.B.A., A.R.I.A.S., has achieved a lively attractive centre for the display and sales of electrical domestic and commercial equipment.

Mr. Campbell, working with teak and marble for the fascia, ingoes, pillars and pilasters, has provided a recessed "walk in" space protected from the weather yet open to the passer-by where the prospective customer has, through the plate-glass window and entrance doors, a completely unobstructed view of the interior of the showroom.

Effective interior decoration is achieved by three harmonising shades of wallpaper and a rust-colour carpet, the dais and window platform being carpeted in blue—which forms a striking contrast to the mahogany wall and floor fittings.

A section of the basement showroom which has been highly praised by many critics for its clean layout



Electrical installation in the showroom is controlled by four switches, with pilot lights, situated at the office entrance, which control showroom lighting, office and basement lighting, heating and showroom plugs and sockets.

Lighting in the street level showroom is provided by two large cupolas and two roof lights which afford ample daylight to filter through the louvres and which are lit in the evening by fluorescent tubes. Some 75 pendant fittings are displayed here; they are suspended from special troughs which provide indirect lighting. This affords a feeling of dignity and spaciousness.

Internally silvered spotlight lamps in swivelling fittings are mounted above the window and in the large showcase, whilst the seven wall showcases are each lit by 4 ft 40 W fluorescent lamps screened by stainless steel baffle plates. The four small shadow boxes are lighted by 250 W spot lamps directed down behind the article displayed.

The basement showroom has been designed for use as a television theatre and for demonstrations of washing machines, cookers, refrigerators and kitchen equipment and appliances. Here again the general room lighting is supplemented by spot-lights showing up the salient features of the appliances. An interesting feature is the continuation of the wallpaper up over the ceiling and cross-beams. Carpeting is again rust-coloured, whilst all paintwork is white. The effect is seen in our illustration.

The result of the architect's work is a centre of which Glasgow can be proud. Most certainly Scott's have shown the way to increase sales even in such critical times as these.

ELECTRICITY AND THE FRENCHWOMAN

Prospects of domestic electrification in France are reviewed in fifth Caroline Haslett Trust Lecture

A COMPREHENSIVE review of the conditions and problems of domestic electrification in France was given by MRS. M. PEARCE (Senior Housecraft Adviser, South-Western Electricity Board), in delivering her Caroline Haslett Trust lecture, "Electricity and the Frenchwoman," at the I.E.E. on Monday night.

Mrs. M. Pearce

In her task of finding out the Frenchwoman's opinion and knowledge of electricity, Mrs. Pearce visited Metz, Strasbourg, Mulhouse, Marseilles, Nice, Grenoble, Chamberey, Lyons, Paris, Rennes and St. Brieuc, so as to obtain information on the variation in living habits, outlook and racial characteristics, which are involved in a country the size of France, and most of her tour was undertaken under the auspices of APEL (Société pour le developpement des Applications d'Electricité), the French counterpart of E.D.A.

Although electricity consumption in France, after war-time fluctuations, rose to 30,000 million kWh in 1949, domestic consumption per head is only approximately one-sixth of that in Britain. This is due to many causes, amongst which are the disproportion between rise in wages and living costs, and restrictions on development by the supply authority, due both to post-war shortage of plant, and financial considerations. Large increases in plant are removing the first restriction while the higher proportion of hydro generation will, it is considered, place Electricité de France in a stronger financial position, and enable them to carry out the reinforcement to transmission and distribution systems which is essential in many localities before domestic load development of any magnitude could be undertaken. The lightness of existing low-voltage networks and consumer services form a considerable stumbling-block to large-scale development.

The Cost Factor

Other factors to be considered in reviewing the prospects for electrification are the tie-up between the electricity and gas undertakings, the lower price of gas (and gas cookers), the necessity for the consumer to pay the costs of service reinforcement. The electricity authority is also hampered by the fact that it can neither sell appliances nor undertake installation work, whereas the gas undertaking, in theory bound by the same principles, does actually indulge in selling in many places. There is, therefore, little incentive for competition, and it was a commonplace to see electric and gas appliances displayed in the same showroom. An amusing experience which the author relates was to be told (by a manufacturer of solid fuel equipment) that cooking by electricity was not yet sufficiently developed to be offered to the public as a satisfactory service!

Before the war there were widespread public cookery demonstrations and exhibitions. Now, however, the demonstrator is a rarity. Electricité de France has not had a public service of trained demonstrators, and contractors who sell appliances cannot afford to employ them while they are not even employed by all cooker manufacturers. There seems little doubt that one of the first steps towards electrical development should be the re-employment of trained demonstrators, in addition to widespread publicity which, owing to lack of generating capacity, has hitherto been prohibited.

Effect of Costs

It was pointed out that one of the chief obstacles is financial stringency. A review of tariffs indicated the normal choice available between flat rate and block tariffs, but even the lowest block (varying from 1½d. to 2d.) is hardly attractive for extensive consumption, although water heater (off peak) tariffs are in use in certain areas.

Rural development for other than lighting is a problem on its own, not only on account of the physical limitations of the distribution systems, but the conservative outlook of the population. Farmers tend very much to regard electricity as something for farm material and to leave their womenfolk to struggle along under primitive conditions, without labour-saving appliances. This is enhanced by the "family" outlook wherein the younger folk who might be susceptible to newer ideas, are under the financial control of their elders, with a more conservative outlook. Conditions varied, however, in different parts of the country, and some farms visited enjoyed a high standard of electrification.

During the lecture a number of slides were shown. Of particular interest were several examples of French domestic appliances, including cookers and washing machines.

Factory on Wheels

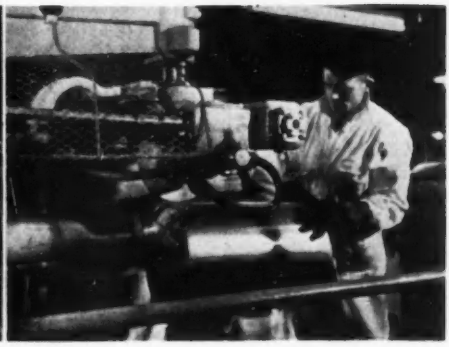
MOBILE DRUM PRODUCTION LINE GENERATES OWN POWER

MOBILITY of a factory is in some ways as difficult to achieve as the much sought mobility of labour. The former ideal does, however, seem to have come about with a trailer-mounted plant for producing steel drums. This has been developed by the Metal Containers Ltd.—Van Leer Group of Companies, with the particular object of providing supplies when they are urgently required, as for instance, when production suddenly increases or when containers are required for seasonable crops.

The basis of the factory is a number of trailers, which carry the necessary machinery, and which are designed to withstand rough travel. These trailers are grouped together on site to provide a continuous floor, and production is then ready to begin on a strict flow principle. Ten machine operators are needed for the 110 ft long production line, which begins with power sheers for cutting the steel sheet to length. Rolling to the required circular shape comes next, with spot welding to hold the cylinder in shape and seam welding to seal the drum side. Special machines perform expanding, flanging, corrugating and seaming operations, and the completed drum is then paint sprayed and dried by passing through an oven heated by infra-red lamps.

Electricity motors are used to drive the machines in the production line, and the first job in getting the factory under way is the starting of the diesel-generator. This is mounted on a trailer separate from the production line units, the fuel oil coming from a special tank car which also carries necessary water supplies. There are two three-phase 400 V generators running in tandem, one a 125 kVA unit providing power for the 100 kVA ignition-controlled seam welder, and the other a 75 kVA rated machine that supplies the motors and the lighting circuits on trailers.

A control board at one side of the generator houses the necessary instruments and rheostats for overseeing the electrical supply, while subcircuits are protected by an oil switch and plug fuse board at the end of the trailer. Much of the electrical equipment is of German or Dutch manufacture, but the welding machines are products of the British Thomson-Houston Co. Ltd.



Diesel driven generating plant is shown to the left, with seam welding on the right

overseas news

Fixed Charges for Wiring

A further step in the control of the electrical industry in Tasmania was taken by that Government last month. A Prices Order has been gazetted which fixes maximum rates which may be charged for the installation or repair of electrical systems and equipment. Under the Order, electrical contractors are required to keep time sheets for themselves and their employees, and job cards giving specified particulars in respect of each service undertaken. The State Assistant Prices Commissioner has said that these records were the minimum acceptable to the Prices Branch, and are in addition to those which must be kept by traders by the Prices Act.

Battery Production

Eveready (Aust.) Pty., Ltd., is planning to spend £250,000 on expanding its Sydney battery manufacturing plant, the managing director, Mr. E. L. Brisbin, has stated. Mr. Brisbin, who has just returned from a world tour, has said that the company intended to expand its zinc rolling mills.

Subsidy for Expansion

The first subsidy to be granted under the Electricity Supply (Country Areas) Act, recently passed by the South Australia Government, is one of £7,500 in respect of the Cedima undertaking—a diesel station. Altogether £15,000 is to be spent on improving the existing supply. Of this sum £3,350 is for the purchase of the undertaking which was privately owned, and £5,000 for a new power house.

Tower Production

Plans were well under way for the erection in Hobart of a plant to manufacture towers for supporting power lines, the Hydro-Electric Commissioner for Tasmania, Mr. Knight, stated recently.

The electrical engineer to the State Hydro-Electric Commission, Mr. K. C. Davidson, has returned from the United States, where he investigated methods of making steel transmission line towers, Mr. Knight added.

Diesel Plant

Now in Australia, Mr. A. P. Good, deputy chairman and managing director of Brush Electrical Engineering Co., and chairman of A.B.O.E. Export, Ltd., while in Sydney, offered to help that city in regard to power plant. He intimated that his organisation could supply diesel generating plant within eight to ten months—as quickly as America. If market conditions in Australia justified it, his company would go into production there, he observed.

Switchover

The State Electricity Commission of Victoria took over control of the Newport "A" power station from the Railways Department on January 21, the authorisation being made by a recent Order in Council.

A Hold-up

Generating plant for the Melbourne City Council's new Spencer Street power station is expected to reach that city next month, but the station will not be quite ready for it, for work stopped on the station and on the Russell Place substation nearly three months ago, when the builders' unions declared the jobs "black," because of a dispute. Builders' labourers have since resumed. The city electrical engineer, Mr. B. Woodfull, has said that if the work had not been interrupted, Council officers would have done in three years a task which overseas advisers had said could not be done in less than five.

The Burdekin Project

Recently returned from his visit to London, Mr. Hanlon, the Queensland State Premier, is expected shortly to give the signal for work to start on the Burdekin River irrigation and power scheme—with or without Federal support—according to reports. Already the Burdekin River Authority, formed to handle the project, has held several meetings. The Burdekin River and its tributaries drain an area of 50,000 square miles. Under the plan, a dam 2,900 ft long and 150 ft high would span the river just below the falls, to create a lake to hold six million cubic feet of water. An underground power station would be built at the dam, to supply to surrounding territory and link up with the Tully Falls hydro-electric scheme to supply power north of Townsville. A diversionary dam would also be constructed some twenty miles downstream.

A Rural Preserve?

The Saskatchewan Provincial Government is reported to be considering the adoption of a policy which would prevent municipally and privately-owned power undertakings extending their lines to serve rural areas. The Government has not yet decided whether a statutory change would be needed to implement the measure. If it is found necessary, however, it would likely be introduced at the next session of the legislature. At present the Saskatchewan Power Commission administers provincial legislation under its Act, which includes extensions to private and municipally-owned undertakings. The Government argument in favour of a ban on private and municipal power extensions in rural areas is that the government-

owned Power Corporation has the wider perspective of the whole province in planning farm electrification. The Government feels that it could carry out the over-all electrification programme in the most economical way, while preventing any overlapping of power lines.

New Departure in Transformers

The Aluminium Co. of Canada has placed an order for 16 20,000 kVA oil-cooled transformers with the Canadian General Electric Co., for installation at the Chute de Diable power station on the Peribonka River. One bank of three transformers are to have windings of aluminium wire instead of the conventional copper—probably the first application of its kind—according to the report.

Des Joachims at Full Strength

The last of eight 60,000 h.p. power units at Des Joachims hydro-electric development was put into operation by the Hydro-Electric Power Commission of Ontario last month.

O.H. Line Scheme

Construction is shortly to commence on the erection of a new 170 kV transmission line to carry power from the Consolidated Mining and Smelting Co.'s Cora Lynn plant on the Kootenay River to a point between Ainsworth and Coffee Creek on the main Kootenay Lake. This will include what is claimed to be the world's longest overhead span—a distance of two miles across the lake. The scheme, which will cost $3,000,000, is to be completed in about two years.

Power and Irrigation Project

Work has begun on the Chambal Valley Development Project in Rajasthan, India. It envisages construction of three dams on the Chambal river with a power station at each, generating a total of 180,000 kilowatts. (The present requirement of the region is 67,000 kW.) The first dam, called the Gandhi Sagar Dam, in Madhya Bharat, on which work was started over a year ago, will be 1,250 feet long and 200 feet high. The lake will hold seven million acre-feet of water. When the project is completed its hydro-electric grid system will supply energy to a large area between Ahmedabad and Bharatpur, and the irrigation system will command more than one million acres of land. Total cost of the whole scheme will be Rs 350,000 million.

Power for Kashmir

The Government of Kashmir has placed orders for hydraulic and electric machinery worth Rs 5 million with Swedish and British firms for the 15,000 kW Sind Valley hydro-electric project. The project is estimated to cost Rs 15 million. Giving this information, Kashmir's Development Minister, Mr. Ghulam Mohammad Sadiq, also stated that new machinery worth Rs 100,000 for the 3,000-kW Mohora power station, which was at present feeding all consuming centres in the Kashmir Valley, was on its way to Srinagar. When the Sind plant started working, he added, power from Mohora would be harnessed for irrigation. To overcome handicaps of financial stringency, the Government was also experimenting on a scheme of small-scale electrification. Work had begun on three small power plants in the Kashmir Valley, with funds provided by local co-operative societies. These would be operating by the end of April. If successful, the experiment would be extended throughout the State. The Minister also disclosed that the Government of Kashmir had entered into an agreement with the Punjab Government for the purchase of electricity in bulk, this being more economical than construction of a large power plant in Jammu.

Nationalisation

The Punjab State Government is to take over all electric supply undertakings in the Punjab on the expiry of their current agreements, Dr. Gopichand Bhargava, Chief Minister of Punjab, announced recently. The Government would undertake to supply electric energy in rural areas, wherever demanded by people for agricultural purposes only, he said.

Railway Electrification

Commenting on reports that the North Island railway electrification and other major public works would be postponed, the New Zealand acting Prime Minister, Mr. K. Holyoake, said the Government had not seriously considered any postponement, and no decision on the matter had been taken. But the Government would have to decide on the respective priorities if the rearmament programmes of other countries created serious shortages of basic materials required for the N.Z. undertakings.

Power Report

The report of Sir William Halcrow and his panel of engineers, on the proposed hydro-electric schemes on the Zambesi and Kafue Rivers, has now been completed and submitted to the Hydro Electric Commission set up by the Government of Southern Rhodesia. The investigations began two years ago. Sir William is now on his way back to Britain. He estimates that the projects would take about seven years to build.

Big Loan

A loan of $30 million was made by the International Bank for Reconstruction and Development, to the Electricity Supply Commission of South Africa last week, to assist the expansion of its generating, transmission, and distribution facilities. The period of the loan is twenty years.

S. Rhodesia Expanding

Work is well advanced on extensions to Umniati power station of the Electricity Supply Commission of Southern Rhodesia. At present of 20 MW capacity, a further 10 MW turbo-alternator is now being installed. Ultimate capacity of the station is put at 140 MW.

PERSONALITIES

IN THE INDUSTRY

Yesterday, January 31, saw the retirement of **Mr. A. Sargent,** who has been works manager at the Helsby works of British Insulated Callender's Cables Ltd., since 1946. He has spent a lifetime in the cable making industry, starting with W. T. Glover and Co., Ltd., at Trafford Park, where he eventually became works manager. In 1928, he joined the Macintosh Cable Co., Ltd., at Derby, and when those works closed in 1937, he took up duties with B. I. at Helsby, where he became manager of rubber cables production, and ultimately, works manager. Mr. Sargent's insistence on tidiness and orderliness, has expressed itself in the general working conditions for which Helsby is renowned, and he has always been particularly concerned with the welfare of the workpeople. His active interest in accident prevention resulted in the factory achieving the best safety record in the whole of the cable making industry. His many friends in the industry will wish him good health and a happy retirement.

Mr. A. Sargent

A part-time member of the North Western Electricity Board, **Mr. John R. Potts,** who is a former Mayor of Carlisle and was for many years chairman of the Electricity Committee, has been elected chairman of the reconstituted and enlarged local advisory committee of the Carlisle District State Management Scheme. He has been chairman for the past four years.

Retiring after fifty years' service in the electrical industry, **Mr. H. W. Everitt,** M.I.E.E., has resigned his appointment as engineer with the Air Ministry Works Directorate at the R.A.F. station, Hawarden. He was the first engineer and manager of the Clacton U.D.C. Electricity Dept. from 1906 to 1919, before becoming assistant works engineer to Johnson and Phillips Ltd. at Charlton. From 1941 to 1944 he served with the Royal Engineers.

Mr. C. Welford, who has been on the technical staff of the Maidenhead electricity undertaking for the past 15 years, has been promoted to development representative for the Bracknell area of the Southern Electricity Board.

Also leaving the Maidenhead district of the Board is **Mr. J. H. Classy,** mains engineer since 1947, who has been appointed assistant sub-area construction engineer to the South-Western Board at Camborne.

Expected in this country within the next few days is **Mr. J C. Callinan,** electrical superintendent to the State Electricity Commission of Victoria, Yallourn, who is on a four months' world tour to study the latest overseas trends in high-voltage transmission. Mr. Callinan has already stopped in Italy for a few days, and, in addition to his call in this country, is to visit Sweden, France, Germany and America, we understand. He is particularly concerned with problems connected with 220 kV transmission—the method to be used on the Yallourn-Melbourne and Kiewa-Melbourne power lines.

We understand that **Mr. J. Field** is to be appointed general superintendent of the Yallourn territory of the State Electricity Commission of Victoria, Australia. He succeeds **Mr. W. Morrison,** who will retire when a new assistant general superintendent is appointed. The latter post is at present held by Mr. Field. Mr. Morrison has been engaged at Yallourn for nearly 30 years, commencing there as assistant mechanical engineer.

Merz and McLellan (South Africa) announce that they have now taken into partnership **Mr. Harold J. Beard** and **Mr. T. R. J. Bishop,** in addition to the partners of Merz and McLellan and the present resident partner Mr. S. G. Redman. Mr. Bishop is also resident in South Africa.

Mr. Hugh P. Barker, managing director of Parkinson and Cowan, Ltd., has accepted the invitation of the Minister of Transport, to become a part-time member of the British Transport Commission.

Retiring after nearly 34 years' service as chief draughtsman of Hopkinsons Ltd., **Mr. J. H. Bottomley** was the recipient of a presentation made at the Britannia works last Thursday. **Mr. G. Sewell,** chief mechanical engineer, took the chair at a representative gathering of members of the staff, and **Mr. R. McKie,** director and secretary presented Mr. Bottomley with a cheque from the directors, staff and outside representatives.

The Bradford branch of the Electrical Association for Women held a dinner in Bradford on Friday last to celebrate their twenty-first anniversary. A presentation of a travelling clock was made by the secretary, Mrs. L. Inglis, to **Mrs. C. Cowling,** who has been chairman for 15 years. Dame Caroline Haslett, founder and director of the Association, spoke of the valuable work performed by the branch.

Nominated as representative of the Electrical Power Engineers' Association in the "Training for Industry team" which sails for New York next Thursday, is **Mr. A. M. F. Palmer,** A.M.I.E.E. The team, which is to represent the whole of the British Industry, is going to the U.S.A. under the auspices of the Anglo-American Council on Productivity, to study American methods for the selection and training of foremen and supervisory grades. Mr. Palmer, who was M.P. for Wimbledon from 1945-50, is vice-chairman of the B.E.A.'s Advisory Committee in Education and training. He joined the staff of the E.P.E.A. in 1945, having earlier been with the former London Power Co., for eight years as an assistant engineer.

Mr. A. M. F. Palmer

Mr. G. Hemmant has been appointed chairman of the Nigerian Electricity Supply Corporation, Ltd., in place of the late Major E. Seaborn Marks, and **Sir Robert Renwick** has been appointed a director.

The Mond Nickel Co., Ltd., announces that **Mr. L. H. Cooper,** has been appointed chairman and **Mr. L. K. Brindley,** managing director. Mr. G. Archer and Mr. A Parker Hague continue as directors, and **Mr. I. A. Bailey, Dr. L. B. Pfeil** and **Dr. A. G. Ramsay,** have also been appointed directors.

Senior demonstrator with the North Western Electricity Board at Oldham, **Miss Joan Sharp,** has been awarded the Elizabeth Sloan Chesser Cup for 1950. The cup is awarded annually to the demonstrator gaining the highest marks in the practical tests for the E.A.W. Diploma in Electrical Housecraft. Runner-up for the 1950 award, was **Miss Brenda Joyce,** of Maidenhead. Miss Sharp, by the way, was among the last four contestants in the recent competition for the Dame Caroline Haslett Trust. Demonstrating has been her sphere for about twelve years, the last two of which have been at Oldham. Earlier, served for a time with the Stalybridge undertaking.

The Executive Council of the A.S.E.E. has awarded the second Fellowship of the Association to **Mr. F. W. Smith,** the present chairman.

Mr. D. Z. de Ferranti, has resigned from the board of Ferranti Ltd.

OBITUARY

Formerly with the Wallasey Corporation Electricity Department for over 40 years, **Mr. G. Starkey** died recently. He retired from the position of mains engineer in 1941.

We regret to learn of the death, on January 24, of **Mr. J. R. Dick,** B.SC., M.I.E.E., aged 79, who had been chairman of W. Lucy and Co., Ltd., for very many years. He joined that concern in 1905 as managing director, after holding a similar position with the Reason Manufacturing Co. for seven years previously. Educated at Edinburgh University and the Central Technical College, London, he later spent about five years at the Brighton Electricity Works, where he gained valuable experience. He was a joint author of a treatise on "Electric Mains and Distributing Systems," and also published a book on *Economics of Works Costs.* On the latter subject he also contributed several articles to the ELECTRICAL TIMES.

We note the death on January 17, of **Mr. C. C. Metcalfe,** A.M.I.E.E., aged 81, who supervised the complete electrical installation at the Manchester School of Technology (now the College of Technology), and after completion of the work was appointed the first electrical engineer to the Manchester Education Committee. Subsequently he carried out an extensive programme of electrification in the city's schools. He was also a part-time lecturer in electrical installation work, and author of a book on that subject. He retired in 1925.

WILLS.—**Mr. H. M. Harris,** chairman of T.M.C.-Harwell (Sales) Ltd., left £10,827 (£10,644 net value).

Mr. B. G. Donne, lately joint managing director, Automatic Coil Winder and Electrical Equipment Co., Ltd., left £68,243 (£65,386 net value).

T.U.C. DISCUSSES PENSIONS

THE question of supplementary pensions in industry is again in the news, and the Government's proposal to set up a full-scale inquiry into the matter evoked a lively debate at last Wednesday's meeting of the T.U.C. General Council. Opinions were divided between unions whose members were mainly employed by nationalised industries and those in private organisations. There was, however, no positive result to the discussion, nor any decision as to future policy, the matter being referred back to the economic committee.

During the past year or two, the T.U.C. has had periodic meetings with Mr. Morrison on the Government's attitude to pensions in nationalised industries, which have been discouraged from concluding agreements on the subject. The T.U.C. has contended that this attitude was an interference with freedom to negotiate. The Government has made it clear, however, that the Boards of nationalised industries were free to negotiate on supplementary pension schemes if they wanted to, but that Ministers, who would have to approve such schemes, would decide each case on its own merits. The matter was brought to a head by the proposal for an inquiry, and also by the Coal Board's agreement to the principle of a scheme for the coal industry. Electrical workers are among those who are pressing for pension schemes.

New Literature

Voltage Stabilisers

by F. A. Benson, M.Eng., A.M.I.E.E., M.I.R.E.

FOR many industrial and research purposes, a source of voltage, stable within comparatively narrow limits, is required. Many circuits and automatic devices have been designed for this end, some providing control of many kilowatts and others being useful with comparatively light loads. This book is mainly concerned with the latter, both for a.c. and d.c., and does not touch devices such as automatic tap-changing transformers or moving-coil regulators. Principally the devices described employ electronic means, although the first chapter gives an analysis of the use of magnetic saturation. The use of glow-discharge tubes is dealt with thoroughly and many circuits involving thermionic valves are described in detail. The final chapter, headed "Miscellaneous," covers some interesting circuit arrangements using barretters, Metrosil, lamps, r.f. power stabilisers, and so on. A bibliography covering some 290 references is included, to enable the reader to obtain the original papers should he wish to investigate further.

The book is well illustrated, and gives ample practical data to allow the reader to apply the information given to his own requirements, and further, it provides in one volume a wealth of information previously only to be found in numerous scattered papers and technical publications. Published by Electronic Engineering, 28 Essex Street, Strand, W.C.2, 125 pages, 8½ in. by 5 in. Price 12s. 6d.

Theory and Design of Inductance Coils

by V. G. Welsby, Ph.D., A.M.I.E.E.

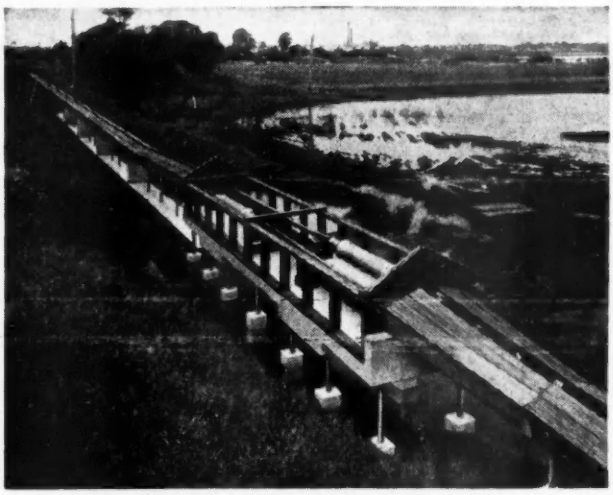
ALTHOUGH the pages of this volume are splattered with algebraic formulae, the approach is essentially practical, and the whole arrangement of the book is aimed at assisting the electronics or communications engineer who finds it necessary to design his own coils. After the necessary basic theory has been briefly covered, the general principles of coils with air, laminated-iron and dust coils are discussed, with particular attention to eddy current losses and hysteresis and to stranded wire design. Separate chapters consider the frequency curves for the various type of coil, and the author then proceeds to the details of design. A useful additional chapter deals with suitable methods of impedance measurement. Published by Macdonald and Co. (Publishers) Ltd., 180 pages, 8½ in. by 5½ in. Price 18s.

An Unusual Cable Joint Bay

A NORMALLY buried cable joint bay, which is being built several feet up in the air is one of the unusual features of the South—Fremantle—East Perth interconnector, now under construction in Western Australia.

The bay is approximately 700 yards from the Swan River on low-lying and marshy ground, and the cable is buried in a railway embankment to within 50 yards of the bay, which lies in a hollow.

Dredging is in progress on the river, and the silt is being pumped on to the low ground, so that it will eventually build up to the same height as the railway embankment, several feet above the bay. In order to keep the cable level and at a reasonable final depth it has been necessary to build it up "on stilts" as it were.



The 66 kV joint bay before burial

Supplied by the Pirelli-General Cable Works Ltd., this new 66 kV oil-filled cable, which is said to be the highest voltage cable yet used in Australia, has been necessitated in the Perth area, due to airport approaches, and is about 2½ miles long. The remaining 14 miles of the route is in overhead line.

Construction work has been carried out by the State Electricity Commission of Western Australia, assisted by Pirelli-General engineers.

CARBO-NITRIDING FURNACES

Recent G.E.C. Developments

RECENT developments in electric furnaces for carbo-nitriding have been announced by the General Electric Co., Ltd. This case-hardening process, consisting of heating the steel in a suitable gas atmosphere, produces a skin on the steel similar to that produced for many years by salt-bath cyaniding, but has several advantages over the older method, since the presence of nitrogen as well as carbon increases the degree to which the case can be hardened. Thus the carbo-nitriding treatment—like salt-bath cyaniding—results in the formation of a "hardenable" case at treatment temperatures some 100° C. lower than those used in normal carburising practice. Treatment at these lower temperatures reduces the amount of distortion. Furthermore, the resistance of the case to wear is greater than that of a comparable case produced by carburisation alone.

The process is particularly suitable for the production of hard, shallow, wear-resistant cases which have general characteristics comparable with those obtained by treatment in a cyanide-bath. The gaseous process can result in a much greater economy for certain classes of work, and when used in conjunction with continuous furnaces produces a greater "through-put" of work which, if desired, can be fully heat-treated in a protective atmosphere. In addition, since the ammonia and hydrocarbon gas contents of the carbo-nitriding atmosphere are independently controlled, the process is extremely flexible and permits absolute control over the nitrogen and carbon contents of the case.

Process

The atmosphere suitable for the process consists of a carburising gas, normally a mixture of carbon monoxide, hydrogen and nitrogen, which is generated by passing town gas and air over charcoal, or other catalyst, contained in a retort heated to approximately 1,000° C. Propane and ammonia are added to the gas so generated, the combined amounts being approximately 10%, and the mixture is then recirculated over the work at, say, 850° C., for sufficient length of time to produce the required depth of case. The work may then be quenched and tempered or given an isothermal treatment to develop the required properties.

Fig. 1. Batch-type carbo-nitriding furnace

Broadly speaking, for a given temperature of treatment the case depth obtained is similar to that obtained in a salt-bath. However, the surface concentrations of nitrogen and carbon may be varied in the carbo-nitriding process by suitable adjustment of the rate of addition of ammonia and hydrocarbon to the atmosphere.

Furnace Design

Furnaces for carbo-nitriding may be either of the batch or the continuous type, and are of similar design to those in use for gas carburising. Usually, where a quench or isothermal treatment is given to the material after carbo-nitriding, the bath is made an integral part of the furnace so that the work is maintained in the atmosphere right up to the time of immersion. A batch furnace suitable for the process is shown in Fig. 1. The work is supported in heat-resisting trays in a gas-tight heat-treatment chamber, and the gas mixture is forced over the charge by a fan in the base. Continuous furnaces may be of the "pusher" or rotary-hearth type; in the pusher furnace the work is normally loaded on to trays or suspended from skids. An outline drawing of a continuous furnace suitable for carbo-nitriding followed by isothermal heat-treatment is shown in Fig. 2. Recirculation of the gases within a continuous furnace is essential, and suitable gas-locks must be provided to protect the furnace atmosphere during charging and discharging.

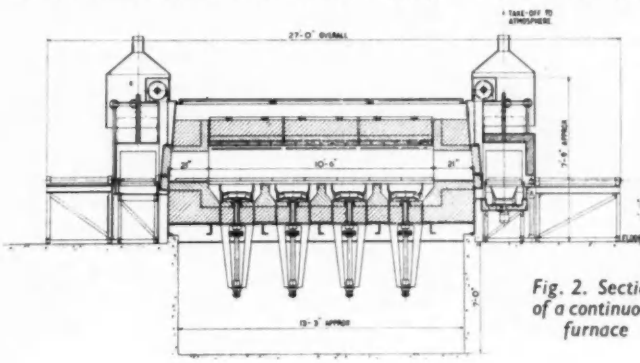


Fig. 2. Section of a continuous furnace

British Standards

Dimensions of unscreened camshaft and magnetos. *B.S.1644 : 1950. Price 2s. 6d.* This British Standard forms one of a series relating to magnetos, dynamos and similar units for internal combustion engines. It deals only with the dimensions of unscreened, camshaft-speed magnetos (combined with distributor head) having shank and spigot mountings. The dimensions included are those necessary to ensure interchangeability. The figures included are of typical magnetos and do not purport to represent standard designs or methods of locking the distributor head.

Electrically driven point-operating machines for railways. *B.S.581 : 1950. Price 2s.* A revision of the 1934 edition, this standard covers electrically driven machines for operating railway points, derailers, movable diamonds and facing-point or fouling bars. The main amendments in the present revision include recognition of hand-generator machines as a standard type, while low-speed, low-voltage machines are no longer standard. The specification has been enlarged to cover different performance requirements for identical machines required for use with both bull-head and flat-bottom switches; for the latter condition the voltage rating for low-voltage machines is increased from 30 to 40 V. An insulation resistance test is now specified.

The standard lays down the sequence of operations and the standard voltages; it gives requirements for general construction and protection from weather, for the motor, wiring and terminals, for manual operation and for performance. The information to be given by purchasers and suppliers is stated in appendices.

British Standards reviewed above can be obtained at the prices stated from 24 Victoria Street, London S.W.1.

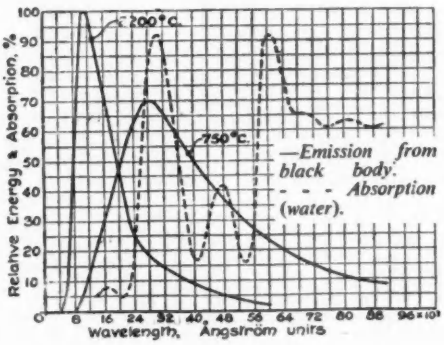
ELECTRICAL DRYING

SOME interesting information on radiant heat drying techniques is given in a paper entitled "Heating by Electrical Elements" which was presented to the Institute of Fuel yesterday by MR. J. T. SHARPLES, B.SC.Tech., A.M.I.E.E. (Metropolitan Vickers). In recent years much attention has been given to the infra-red lamp, which affords a convenient form of heat radiation with peak energy emission at a wavelength of about 11,000 Angström units. The lamp has the advantages of a sharp cut-off and low convection heat loss, and has been successfully applied to many processes. It is not necessarily, however, the best source of radiation for many drying processes, especially those where a thin surface film of water is maintained on the substance to be dried.

Many materials, and most liquids, exhibit a pronounced degree of selectivity with regard to wavelengths in the proportion of incident radiation which they absorb. Any consideration of radiant heating should, therefore, take into account the wavelengths covered by radiations from the heat source, as well as the total rate of energy emission. The infra-red lamp filament runs at about 2,200° C, and most of its radiation is contained in the waveband 6,000 to 40,000 A. The spectral absorption curve for a very thin film of water peaks at 30,000 and 60,000 A, and this matches better with a radiating temperature of 750° C than with 2,200° C.

The effect of this selectivity is lessened as the film of water becomes thicker, because the radiation that passes through is absorbed by successive layers.

Reducing the operating temperature of an infra-red lamp will not effect the improvement in efficiency that the above figures suggest. The



Energy distribution and absorption curves

solution adopted is to use tubular sheathed elements mounted in front of a specially treated aluminium reflector. Such a unit with three elements can have an average intensity of 1,500 watts/sq. ft., 50% greater than is usual with infra-red lamps.

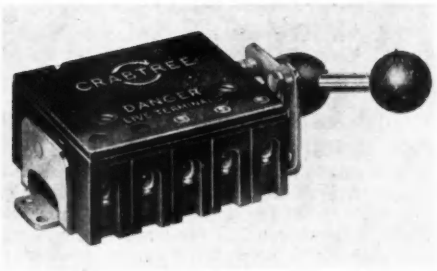
In use the element projector has the advantage over the lamp that its temperature, and hence its average intensity and spectral distribution can be adjusted readily over a limited range, by means of a cyclicly operating on/off switch. The relatively large radiating surface, as compared with a lamp filament, results in a reasonable intensity of radiation even down to, say, 75% of normal temperature.

The BUYER'S *Column*

New Pattern Crabtree Isolator

THE latest 500 V 50 amp a.c. isolator by J. A. CRABTREE AND CO., LTD., Lincoln Works, Walsall, Staffs, is designed for use with all Crabtree motor starters and control panels. It is a self-contained and heavily insulated unit, and is normally supplied as a 4-pole unit, 3- and 5-pole units being available.

The fourth pole breaks first and load interruption is made by the contactor. In all instances the



isolator is capable of opening the circuit under load conditions at its rated capacity, and so has many varied applications.

The isolator is held in position by the bearing of the switch arm which passes through the side of the housing, and by two screws which fix the rustproofed steel cradle to the back of the housing. This steel cradle accommodates the spring mechanism of the switch arm assembly and provides attachment for the individual and separately fixed single-pole moulded switch bases.

Where the isolator is used with a contactor, the left-hand cam, which is of a different form from the other four, breaks the operating coil circuit first and thus automatically ensures that the supply is broken by the contactor. This action is a feature which makes for double protection since the coil circuit is not completed until the isolator is switched fully on.

Wiring terminals are of a heavy clamping pattern, and each switch base is completely isolated from its neighbour. All live metal parts are deeply recessed and a moulded plate, fixed by two captive screws, covers the cavities in the switch bases.

Bringing Prices into Line

ADVICE of price changes has been received from three other firms. HOTPOINT ELECTRICAL APPLIANCES CO., LTD., Crown House, Aldwych, London W.C.2, announce increased prices which are effective from January 29. These are as listed in the next column.

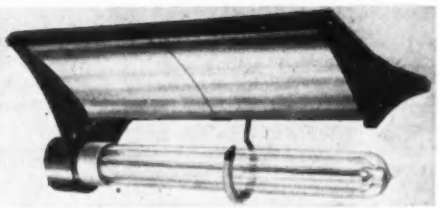
Cat. No.	Apparatus	New List Price	Purchase Tax
		£ s. d.	£ s. d.
658C1	Plus 5 Iron	3 2 6	—
81500	Torribar Kettle ...	3 15 0	—
30A	Bowl Fire	2 0 0	1 9 5
16	1,000 W Fire	2 10 0	1 16 9
93	2,000 W Fire	3 10 0	2 11 5
80854	Toaster	2 10 0	—
614P1	Percolator	4 15 0	—
80713	Warming Plate ...	11 0 0	—
80714	" "	16 0 0	—
76116	Boiling Ring, open coil	1 10 0	—
76123	" " Torribar	4 15 0	—

CHILTON ELECTRIC PRODUCTS LTD., Hungerford, Berks, inform us that the new price of the BUK shaver is £5 9s. 9d. inclusive of £1 2s. 8d. purchase tax. This increase came into effect today, February 1.

M.K. ELECTRIC LTD. also announce an increase of approximately 5% on certain accessories as from February 1. A new price list is available.

G.E.C. Sodium Lantern for Main Roads

AN economical and efficient method of using sodium lamps for main road lighting is provided by a new G.E.C. open type lantern with an optical system consisting of four curved mirrors in the "Seagull" arrangement. The lantern is protected by a galvanised and stove-enamelled top canopy. Either an 85 W or 140 W Osram sodium lamp may be used. Although the lantern is designed primarily for lighting roads between 30 ft and 40 ft wide, the horizontal



position of the light source gives better results on roads over 40 ft in width than are obtainable with a vertical lamp.

The iron end castings of the lantern are held together by four tie rods, the centre pair carrying a pressed steel bracket suitably reinforced and tapped for top entry mounting.

"Attention Please!"

NOW available from JULIUS SAX AND CO., LTD., 24 Commerce Road, Brentford, Middlesex, are two models of luminous call indicators which we are confident will find a ready market in the professional and commercial worlds.

Model 7311 is a flashing type indicator suitable for hospitals, doctors, waiting rooms, etc. On pressing the switch an audible signal is made and the wording in the small glass panel is illuminated by a flashing light which flashes for approximately 10 seconds to 3 minutes as required. Supplied in a polished hardwood case with coinage bronze front plate with wording "enter," the indicator is for 12 V a.c. supply and retails at 65s.

Second model, 7321, is similar to the above but has dome glasses in red, blue, green, amber as required alongside engraved labels. One way model is 65s., 2-way model 115s. and 3-way models 160s. each.

"All Fingers and Thumbs?"

SO simple yet so useful is an apt description of two small "gadgets" now marketed by the ACRU ELECTRIC TOOL CO., LTD., 123 Hyde Road, Ardwick, Manchester 12.

The first is the "Pyrogrip" a handy attachment which clips on to the blade of a screwdriver and holds screws and bolts when fixing in awkward inaccessible positions.

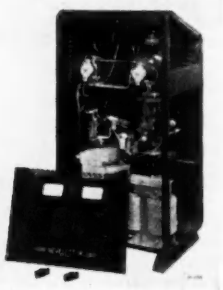
Overall length is $1\frac{1}{2}$ in. and diameter approximately $\frac{5}{32}$ in., price is 6d. each. These "Pyrogrips" are supplied on an attractive showcard, containing 3 dozen tools.

Second is the "Acru" finger-tool. This is supplied in three versions: a finger-clipping box tool which will hold size 0, 2, 4 and 6 B.A. nuts in position when screwing in the bolts, tweezers on the finger grip thimble with sharp, flat or round noses and screwdriver ends on thimble for holding bolts when tightening the nut.

These chromium-plated tools are simplicity itself but will help speed up assembly work in no uncertain manner. Prices range from 7s. 6d. for a set of 4 boxtools, to 2s. 10d. each for the finger-clip tweezers.

Cinema Arc Rectifiers

EXPERIENCE gained with the thousands of Nevelin cinema arc rectifiers already in service has been responsible for many of the improvements in the new Senior and Junior models re-designed by the NEVELIN ELECTRIC CO., LTD., Purley Way, Croydon.



The "Junior" Nevelector

Greater accessibility and ease of component replacement have been specially catered for in the new equipment, whilst better cooling and greater capacity of transformer and ignition relays are improvements designed to give even longer trouble-free operation under most adverse conditions. The operating characteristics on the new models are unchanged but an attempt has been made, in a number of ways, to anticipate the trend of requirements in the cinema industry.

"Linoglas" Interval Reflection Signs

AN interesting range of sandblasted glass panel signs is available from LINOLITE LTD., 158 Bishopsgate, London E.C.2. These are the plane glass type with sandblasted lettering which is thrown into relief by transverse lighting through the plane.

Standard sizes are 12 in. x 6 in. to 31 in. x 9 in., and prices include 15 alternative standard wordings. The fittings are available in bronze or chromium. Glass is $\frac{1}{4}$ in. polished plate with rounded corners and standard letterirg is white roman.

Specimen prices are 103s. for the single-sided 12 in. x 6 in. size in bronze and 281s. 9d. for the 31 in. x 9 in. double-sided style in chrome.

An Inexpensive Warming Plate

A WARMING plate for domestic use, of modern design, efficient and yet inexpensive, is the "Arora" model, Catalogue No. 340, which is available from THE ARORA COMPANY, Roseberry Street, Loughborough, Leicestershire.

It is robustly constructed and is designed to provide an efficient hot top plate with a relatively cool body. Size is 18 in. overall length by 9 in. wide by 4 in. height, it weighs $5\frac{3}{4}$ lb. and is rated at 150 watts.

Fitted with rubber feet to protect polished surfaces the warming plate is supplied complete with 2 yards of 3-core flexible cable in a standard finish of crackle black enamel with satin chrome top. On special request the following enamelled colours are supplied: Silver, silver green, silver blue and cream. Price is £3 6s.

TRADE PUBLICATIONS

LIGHTING EQUIPMENT.—Scemco Ltd., Soho Street, London W.1, have issued a neat wallet containing a "Detail Digest" price list and specification sheets of their range of interesting attractive fluorescent lighting fittings.

HOUSE SERVICE UNITS.—Details of a range of sheet steel house service units, together with intake and sealing chambers, which are available from stock, are set out in List HL2/1050 issued by Falk Stadelmann and Co., Ltd., 91 Farringdon Road, London, E.C.1.

RADIO VALVES.—A data sheet is available from the General Electric Co., Ltd., Magnet House, Kingsway, which gives details of the range of "Osram" valves for radio work.

ELECTRIC WATER PUMPS.—A new brochure issued by Rhodes, Brydon and Govatt Ltd., Gorsey Mount Street, Stockport, surveys the advantages of the Fullway "Mopump," an electric vertical unit pump for heating systems.

"How Reliable is a Radio Valve?"

Radio Section Discussion at I.E.E.

AT a meeting of the Radio Section of the Institution of Electrical Engineers on Monday, January 22, 1951, DR. G. H. METSON, M.C., M.SC., A.M.I.E.E. opened a discussion, on "How Reliable is a Radio Valve?"

Dr. Metson began by defining the word "reliability." On both sides of the Atlantic "reliability" targets were being set in terms of valve failures in a stated number of samples in a given running time. Dr. Metson proposed that we might decide, for example, to define a Reliability Factor P of a valve type as the number of failures per 1,000 samples in a 1,000-hr. test. A general objective at present seemed to be the development of certain popular types having $P < 10$, and to give such types the definitive description "reliable."

Sample Tests

Some quantitative significance having been given to the parameter "reliability," Dr. Metson went on to discuss how present-day valves measured up to this standard of $P < 10$, or $< 1\%$ failure in 1,000-hr. test? No detailed or satisfactory answer appeared to exist, although Mr. C. S. Cockerell had recently undertaken work which gave a broad, average indication. Valve types CV131, 136, 138 and 140 had been examined with the following results.

No. of samples	= 18,700
No. of faults	= 697
Duration of test	= 50 hr.
$\therefore P$	$= > 37$

Approximately half the number of the valves had developed faults during the 50-hr. test on stationary racks; the others had been found to be faulty when drawn from stores. The Reliability Factor P of 37 was therefore a very optimistic one, but gave some idea of the amount of work to be done before valves reached the desired standard. Was the target of $P < 10$ too severe for practical achievement?

Dr. Metson posed the question: were there to be "ordinary" valves and "reliable" valves, or were all valves ultimately to be made reliable? If widespread duplication of types were to be avoided, then the second alternative would have to be adopted, but it inevitably implied that "reliable" valves must cost a little more than the present range.

This led the Opener to the main question—how reliable was the radio valve? His answer was that he considered it to be quite reliable enough for present-day entertainment purposes; hardly adequate for serious industrial use; and quite inadequate for use in present day high-speed aircraft equipment.

Practical Experience

Several speakers gave information on specific valve types: one speaker stated that the average life of 27 valves in a certain civil aircraft equipment during one year's operation was only 1,600 hr. He added that, of the 17% of aircraft delays ascribable to radio failures, 60% could be ascribed to faulty valves. A Post Office engineer complained that valves were not so rigorously tested as other components, and stated that the number of telephone faults traced to valves was comparable to that caused by all other associated components.

Miniature valves were mentioned by several speakers as not having yet achieved a satisfactory average life. It was pointed out by other speakers that the figures given appeared pessimistic and the meeting was reminded that most of the valves mentioned were broadcast-receiving types. Current experience with miniature valves appeared to indicate that the number of "catastrophic" failures did not exceed 1%, and that these valves would run for thousands of hours if run under proper conditions.

Dealing with the causes of valve failure, one speaker said of miniature valves that he thought the manufacturers were tending to make the ratings too high so that a greater performance was demanded than a valve of such a size could give. He had found that if the valves were operated at 80% of their specified ratings, a more reasonable life could be expected.

There was general agreement that the variable human element should be eliminated from valve production and testing so far as possible, for if mechanical production methods developed shortcomings, these could generally be traced and remedied more easily.

Eighteen speakers took part in the discussion which followed.

COMFORT IN PUBLIC

Heating and Ventilating on a Large Scale

PROBLEMS that face the heating and ventilating engineer in the design of factories and public buildings were discussed at Leeds last week by Mr. L. COPELAND WATTS, M.I.Mech.E., P.P.I.H.V.E., A.C.G.I., M.CONS.E. The occasion was a meeting of the Association of Supervising Electrical Engineers, but the author excluded all electric methods of heating from his review.

Temperatures required for comfort in buildings depend largely on the activity of the occupants. In offices and halls where people are mainly seated, a usual design temperature is 65° F for 32° F outside, but for a factory where heavy work is carried on, a temperature of 50° F may be all that is required. Ventilation, the other requirement for comfort, is also determined by work. For offices with natural ventilation (open windows) 1½ to 3 air changes/hr is the rate usually obtained, and for mechanical ventilation for the same premises a similar rate of 3 to 5 changes/hr is taken for design purposes when the number of occupants is not known. Where complete planning is possible, 1,000 to 2,000 c ft/min/person is aimed at. For halls licensed for music or dancing, local bye-laws usually require that 1,000 c ft/person/hr should be introduced into the room and at least 75% of this extracted.

Heating

Radiators are usually employed for the heating of public buildings in this country, though convectors placed near the floor are also common. Another method is to employ radiant heat, either by superimposed panels or in the form of embedded panels in the structure itself. Radiators and convectors are more economical in first cost than embedded panels, but the latter are cheaper to run. For comfort, it is generally desirable that the temperature of the structure should be higher than that of the air it contains and this is a point in favour of panels However, they have several disadvantages, including relative slow response to variations of temperature. Because of this the use of embedded panels for heating is much more suitable for a building occupied for 24 hours a day than for one occupied for 6 to 8 hours. Similarly, it is unsuitable for hotel bedrooms, where changes of occupancy are frequent and each occupant may wish to control the heat to suit his own requirements.

Unit heaters are frequently used in factories, where they can produce satisfactory conditions by the proper direction of air flow, though it is often advantageous to provide some direct heating to take care of structural losses.

Hot water or steam are the common media for distributing heat. With water and radiators or convectors, the maximum flow temperature is usually about 180° F, with the return some 20° to 40° lower. For embedded panels the maximum temperature is 120°/130°, with a return temperature 10°/15° F lower. For large factories it is nowadays common to use hot water at temperatures up to 350° F, the whole installation being kept under pressure.

Steam is frequently used, but the author thinks that unless there is exhaust steam available from the generation of electricity or steam process work, this is not the right medium to employ in this country. Low pressure hot water is far more flexible for the purpose of heating when temperatures change from day to day.

Factory Heating

Mr. Watts went on to describe in detail installations in a hospital, a civic centre and in factories. For factories, it is desirable to provide some heating surface to take care of structure loss by means of pipes or radiators sited along the external walls, with coils running under roof lights to counteract the downdraught due to the cooling effects of these lights.

Unit heaters suspended from the roof are suitable for general heating, and considerable heat losses may be avoided by arranging for special unit heaters to blow across any large openings, such as doors for lorries, so as to warm the incoming air.

Special difficulties occur when dust or poisonous gases are a health hazard, and large extract systems are needed to remove them at their source. Large volumes of air may have to be removed to ensure proper protection for the operatives, and if this air is taken from the factory without provision made for warming it, unsatisfactory working conditions may result. It is, however, often possible to ensure by careful design that the air required to make good that which is extracted is introduced close to the machines concerned, in such a way that it does not pass over the operatives and does not, therefore, have to be warmed.

THE WEEK

COMMERCE *in news* INDUSTRY

Private Plant Concessions Extended

THE B.E.A. and fourteen Area Boards have decided to extend for four years the concessions made in 1948 enabling industrialists to supplement supplies from the electricity supply industry by installing their own private generating plant. Following the 1947 fuel crisis, the Government encouraged the installation of private plant, although it did not intend that the plant should cope with the whole of each establishment's power requirements. In pursuance of this policy the B.E.A. decided to waive conditions under electricity supply contracts which curbed the use of private generators, and agreed that the plant could be erected as a standby.

The Authority reviewed the position in 1948 and decided to continue the relaxations up to March 31, 1952, when it was hoped the power plant shortage would have been overcome. The shortage has, however, continued and the arrangements have again been extended, the operative date for the cessation of these relaxations now being March 31, 1956.

Lighting Ban Protest

IT was only to be expected that the prohibition of lighting for advertisement purposes, which included shop window lighting, would create dissension. Objections have been voiced in many parts of the country since the Government's Order came into force, and we select this week the protest of Edinburgh shopkeepers as being typical of the ill-feeling aroused. At their annual meeting, the Edinburgh section of the Scottish Retail Drapers' Association doubted whether the ban was really necessary, and is to ask the Scottish E.C.A. for data on electricity consumption. Particular emphasis was laid on shopkeepers' inability to use their own generating equipment or even candles.

The valuable contribution of shop-window lighting towards maintaining the morale of the people was also an important aspect of discussion, and it is interesting to note that shopkeepers on the other side of the Irish Sea, in Belfast, also have this fact in mind. Although unaffected by the order from Westminster and being in the blissful position of having a plentiful supply of electricity, the city's Chamber of Trade decided to play safe and request their Ministry of Commerce not to restrict lighting there. One member said he supposed they were all agreeable to sharing hardships with traders across the channel, but hastened to add that there was sufficient electricity and any saving in coal would be negligible. The request was, however, in vain, as the Ministry has made an Order similar to that made in this country. The N. Ireland order came into force last Monday and excludes the use of electricity generated from windmills and lighting for the showing of films and slides at cinemas and theatres.

Ground Sulphur Dearer

A BOARD of Trade Order, which became effective last Monday, permits an increase of £3 1s. 6d. per ton on the maximum prices of all grades of ground sulphur. The increase is due to rises in the world price of crude sulphur and freight rates. Copies of the Order, the Ground Sulphur, Prices (Amendment No. 4) Order, 1951 can be obtained, price 2d., from H.M.S.O.

Report on Rhodesia and Nyasaland

DEVELOPMENT in the Rhodesias has been rapid during the past decade, many new industries having sprung into being, each with its call for plant and electricity. The local supply undertakings have therefore been hard pressed to meet the demands, and plans are being made for heavy future requirements. Among the latter is the Kariba Gorge scheme on the Zambesi River, which we have already described in our pages, and on which Government action is expected shortly. These and other projects are referred to in the latest of the Board of Trade's Overseas Economic Surveys covering Southern and Northern Rhodesia and Nyasaland. In this report, the U.K. Trade Commissioner emphasises that while the whole of the area can be regarded as a "traditional market" for British goods, U.K. manufacturers must make the most use of the advantage they at present enjoy, in order to secure their position in the market.

B.E.P.C.—1951

ARRANGEMENTS for the 1951 British Electrical Power Convention, to be held at Brighton from June 18 to June 22, are proceeding apace, and some of the principal events have now been

The First Half-Century

Mr. Edison's first electric invention was a rapid voting machine. This was not a commercial success, as a committee of Congress very promptly told the inventor, it is just what members did *not* want, because the only right the minority had was to delay the game.—*From our issue of January* 31, 1901.

Left is a general view of steel and concrete columns at the entrance to Surrey sub-area H.Q. of S.E.E.B. at Dorking, where an exhibition of street lighting was held last week. Bottom left is Stewarts and Lloyds, Ltd.'s stand in the small exhibition hall, and, below, British Thomson-Houston Co. Ltd.'s stand

provisionally fixed. The electrical exhibition will be opened by the president of the Convention, Sir Henry Self, on the Monday afternoon, and Sir Henry will deliver his presidential address in The Dome next morning. Amongst papers to be read at succeeding sessions are "A Survey of the British Refrigeration Industry," to be presented by Mr. E. G. Batt, director and secretary of the British Refrigeration Association; "Electricity as a National Asset—Its Uses and Applications," by Messrs. N. Elliott (S.E.E.B.) and H. H. Mullens (N.E.E.B.), and one on electronics, by Mr. O. W. Humphreys.

The usual round of receptions and dances have been arranged, with more variety of venue than was possible last year. Technical visits are also more to the fore.

Supplies of Copper Cut

A FURTHER reduction in supplies of copper was announced on Monday by Mr. G. R. Strauss, Minister of Supply. As from to-day (Thursday) supplies to consumers will be limited to 85% of the rate in the first six months of 1950. Delivery to industry during January has been at the rate of 100% of supplies in the period January to June last year. This rate is regarded as some 10% below the true current level of demand. In his announcement, the Minister recalled that on December 7 he had said that the world shortage of copper meant that this country's supplies would not allow maintenance of the current rate of consumption, and that normal civilian consumption would have to be reduced as defence commitments increased.

Warnings by Radio

THE subjects of load shedding and warning of power cuts appear inexhaustive these days, and the most recent news of the latter comes from Yorkshire, where experiments are in hand for warnings by radio. Trial wavelengths have now been sanctioned and the G.P.O. has approved, in principle at any rate, an experimental scheme for the county.

We understand that if the trials are successful, the scheme will later be extended to other areas, but national use will depend largely on the availability of a supply of radio receivers. It is not anticipated that the £10 outlay on a receiver will be begrudged by industrialists, some of whom have already experienced losses far in excess of that amount through power cuts. The scheme will not be operative during the present crisis, but an official of the Y.E.B. has said that it could begin next winter.

Chair of Electrical Engineering

THE chairman of B.E.A.M.A. Council, Mr. G. Leslie Wates, is appealing to all member firms to support the endowment of a chair of electrical engineering at Cambridge University. Until 1944,

Cambridge had no such chair, but in that year the I.E.E. offered to provide the stipend of a professor for five years, and the University accepted the offer despite the fact that no permanent endowment was then in view. The B.E.A.M.A. Council feels that the industry should now establish the chair permanently by the provision of a sufficient capital sum.

New Lighting in Sussex Convent

IN contrast to the many lighting installations featured in these columns from week to week, we have quite a different example this week in a lighting scheme at a Sussex convent which celebrated its centenary with new fittings in some of its old and cherished buildings including the convent chapel. Siemens Electric Lamps and Supplies Ltd. were responsible for the planning of the scheme and supply of equipment.

Due to the construction of the chapel, it was found impractical to suspend fittings from the roof, and consequently 80-watt fluorescent tubular lamps with Perspex diffusers were mounted horizontally on the walls. Supplementary lighting has been provided in the choir stalls, where 20-watt lamps have been fixed to underside of the canopy. Eight 80-watt tubes, mounted vertically in pairs behind each of four columns, provide lighting for the sanctuary. Another part of the convent to receive attention was the refectory, which was lighted by ten reflector-refractor fittings with 200-watt tungsten lamps. These could easily be suspended from the ceiling. Contractors for the job were Hutchinson, Roe and Co., Ltd., of East Grinstead.

Economy or Minimum Consumption

THE Conservative M.P. for Skipton has drawn attention to the conflicting demands of economy appeals and the minimum consumption clauses in agreements with large consumers. These minimum consumption clauses are included in tariff agreements to ensure an adequate return to Area Boards for the cost of laying long extensions of electricity mains to outlying consumers. The M.P. has pointed out to the Ministry of Fuel and Power that there is a tendency to use up the quota even though in many cases the consumer would prefer to use less electricity. He has asked for a dispensation in view of the present fuel crisis. Mr. Alfred Robens, parliamentary secretary to the Ministry of Fuel and Power, has replied to the effect that the matter is under consideration by the Boards, and has passed on the M.P.'s letter to the chairman of Yorkshire Electricity Board.

Farmers Dissatisfied

DURING the annual conference of the National Farmers' Union in London last week, a resolution was passed urging representations to the Government on the lack of progress being made in electrifying rural farms in Wales. It was stated that in Pembrokeshire less than 10% of farmers were connected. Another delegate pointed out that although he was farming within 40 miles of Westminster, he still had no electricity.

While these two complained of no power at all, their colleagues rose to object to the unexpected cuts in power, especially at milking times. It was emphasised that the agricultural load was not during peak hours, and added that it should be possible to give warning of days on which cuts could be expected.

New Plant will Exceed Demand

A HEARTENING note was struck by Mr. H. Nimmo, chairman of the Southern Electricity Board, when he addressed the Board's Con-

Fluorescent and tungsten lighting schemes recently installed in a Sussex convent by Siemens Electric Lamps and Supplies, Ltd. Left shows the chapel and its attractive fluorescent lighting, and (right), the nuns' refectory

Photographs show the lighting installed in the new service department at Ronson House, Strand. Fluorescent lamps predominate in the scheme; note the indirect lighting at the top of the column where there is an inverted 4 ft circular baffle. Incandescent lamps have been sunk into a "Cellotex" false ceiling and lighting for displays has been provided by a number of louvred spot lights

sultative Council recently. He said the capacity of new plant now being installed would definitely exceed the demand for electricity. But the coal shortage was aggravating the position, he said, and urgent measures had had to be put in hand to economise in the use of coal, electricity and gas.

Answering questions after his talk, Mr. Nimmo said he did not think the rearmament programme would affect the manufacture of new generating plant although it was bound to have some adverse effect on distribution. Concerning coal supplies for new plant, he said the coal industry would be hard put and would have to step up output considerably to keep pace with the increased demand for electricity. Finally, in reply to a query about the price of electricity, the Board's chairman pointed out that if it was possible to install a large amount of new plant, the capital charge would be such that they would be forced to increase the price.

Light on Lighters

RONSON House, 352 Strand, opened its new service department on Tuesday of last week. Located underground, in what was once the basement kitchen of a restaurant, the new premises represent an outstanding example of what can be done with the most unpromising situation, particularly when assisted with air conditioning and adequate lighting. There has been no attempt to segregate the workshop from the public—on the contrary, the workshop has been made an integral part of the scheme, and the public can actually see their repairs being carried out in most cases.

Fluorescent lighting is used throughout the workshop, with the exception of certain bench units for intense local illumination. The public portion uses fluorescent cornice lighting, with the addition of incandescent lamps sunk into the "Cellotex" false ceiling which conceals the air-conditioning plant. Localised lighting for display work is provided by a number of louvred spot-lights using internal-reflector lamps.

The new department was designed for Ronsons, Ltd. by W. M. de Majo, M.B.E., M.S.I.A. H. N. Barnes, Ltd. were main contractors.

Chat and Eat

AN extract from Shakespeare's *Taming of the Shrew*, "We sit to chat as well as eat," has been chosen as the motto of the newly formed Ellison Luncheon Club, which held its first meeting at the Queens Hotel, Birmingham, recently. The new club is an experiment of George Ellison, Ltd., of Birmingham, and is designed to foster a closer liaison between the associated companies in the Ellison organisation. We understand that there was an excellent attendance at the inaugural luncheon, when the guest speaker was Prof. A. M. Low, the consulting engineer and research physicist.

A New Lighting Material

RECENTLY developed by Courtney, Pope (Electrical), Ltd. and Plyglass, Ltd., is a new material, "Contralux," designed especially for daylights and lighting fittings.

By arranging two layers of spun glass material between the outer glass, one of which is clear and the other with a "pinhead" finish, a third dimensional effect is obtained.

With the use of this material a "honeycomb" pattern is obtained with a light cut-off effect similar to a metal "egg crate." Another property in its favour is that it reduces the brightness ratios yet at the same time permits a certain amount of "sparkle." Light transmission factor is about 65%, but this varies according to the colours of the spun glass used.

So far there are five colours available which have differing effects and thus having different applications. These colours are shell pink, peach, biscuit, oyster and white.

New B.E.A. Collier Launched

A NEW 2,700-ton collier, *Battersea*, has been launched recently by S. P. Austin and Son for the B.E.A. The naming ceremony was performed by Mrs. H. J. Randall, wife of the chairman of the London Electricity Board. The collier is one of two new ships being built by Austins, and both will be used for carrying coal to power stations on the Thames.

NEWS IN BRIEF

The Electrical Trades Union has now announced that the Pier Pavilion, Hastings, will be the venue for their annual conference fixed for the week beginning May 7.

We have been asked to point out that the figures given last week concerning the production of refrigerators relate to pounds sterling, and not to the number of units manufactured.

The Society of Relay Engineers are to hold their seventh annual meeting at Aldwych House, W.C.2, on April 24. It will be at 11.30 a.m., and followed by a talk on "The Savage Automatic Monitoring System," by Mr. P. Taylor at Film House, Wardour Street, at 2.30 p.m.

The principal electrical exhibit at the Midlands Building Exhibition, to be held at Bingley Hall, Birmingham, from February 14 to 24, will be the stand of the Midlands Electricity Board. This will include examples of nearly every modern domestic electrical apparatus, and will be staffed by experts able to advise the general public and builders and surveyors on the many applications of electricity in the building industry.

The 1951 annual conference of the Association of Supervising Electrical Engineers is to be held at the Victoria Station Hotel, Nottingham, on May 19 and 20.

As a result of the pantomime *Aladdin*, presented by the Elexcel Players recently, £120 was allocated to the E.I.B.A. The show was written and produced by one of Elexcel's employees, Mr. Phil Heyes, and provided a most enjoyable evening for the 350 people who saw the performance.

"Electricity in Agriculture" was the study at a two-day course held at the North of Scotland College of Agriculture recently and organised by the North of Scotland H.E. Board.

Lest there be any misunderstanding concerning the lighting installation carried out in South Street, Eastbourne, and featured in our issue of December 28, the fittings were supplied by Revo Electric Co., Ltd.

B.B.C. commentator, Eric Jolly, collecting data for broadcasts in the North Regional programme from H. Greenwood, station superintendent at Agecroft generating station. Recordings have been taken and will be relayed in a 20-minute programme "How's It Done?" in Children's Hour on February 19

Questions in Parliament

H.P. Policy

Raising the question of Treasury policy in regard to bank advances to finance hire-purchase agreements, Mr. Marlowe later asked the Chancellor of the Exchequer why the British Electricity Authority had flouted Government policy on the matter—the 1949-50 Report had referred to enormously increased hire-purchase contracts? Mr. Gaitskell answered that the original question concerned h.p. credit advanced by the banks, and he was satisfied that they were faithfully carrying out the request, but as to the B.E.A. matter, a further question was needed.

Consumption Target Scheme

The Minister of Fuel and Power was asked by Mr. Wade if he would make representations to the B.E.A. with regard to power cuts, with a view to ensuring that each district should have a consumption target, so that so long as the local consumers kept within their target they would not be subjected to cuts caused by excessive demands in other districts. Drawing attention to the fact that a similar scheme was operated in the winter of 1947-48, but found to have serious disadvantages, Mr. Noel Baker agreed to put the suggestion before the Electricity Sub-Committee of the Joint Consultative Committee.

Company Activities

Aveling-Barford Ltd.

Group trading profit for the year to September 30 last, was £312,128, a decrease of £48,126. The former total includes £13,680 relating to previous years. The sums of £58,258 (*£47,591*), has been charged to depreciation, £18,862 (*£17,556*) to directors' emoluments and, taxation £183,328 (*£188,009*), leaving a balance of net profit of the group amounting to £130,746 (*£184,570*) of which £103,047 (*£43,048*) relates to Aveling-Barford. With £98,259 (*£76,462*) brought in, there is £201,306 (*£218,437*) available. To future tax reserve £27,540 (*nil*), Preference dividends £21,313 (*£14,240*), Ordinary interim 2½% (*5%*) £5,156 (*£10,313*), final 7½% (*10%*) £15,469 (*£20,625*), general reserve nil (*£75,000*), leaving £131,828 carried forward.

Desoutter

We understand that arrangements are in hand for the marketing of shares in the Desoutter electric and pneumatic tools business. To this end, a new concern with the title of Desoutter Brothers (Holdings), has been formed. In making this announcement the directors state that the operation has for its object the provision of funds to pay duties as the result of the death of the late Mr. L. C. Desoutter.

Enfield Cables Ltd.

Preference and Ordinary shareholders are being offered £1,250,000 4% First Debenture Stock, 1961, at par. Letters of allotment are renounceable up to March 15. Proceeds of the issue will finance equipment of the new factory nearing completion in South Wales for the subsidiary Brynmawr Rubber, additional plant for the Brimsdown works and further working capital.

Hubert Davies & Co. Ltd.

Net profit for the year to October 31 of this South African electrical, mechanical and civil engineering concern, was £273,667 (*£237,875*) after charging Union and Rhodesian taxes. There is again a final Ordinary dividend of 20%. The sum of £30,000 is placed to reserves.

R. A. Lister Co.

For the year ended September 30, group net profit was £245,181, compared with £231,542 in the previous twelve months. Of this sum, £934 is attributable to outside shareholders. The total is reached after providing £320,585 (*£270,586*) for taxation, £134,386 (*£109,194*) for depreciation of fixed assets, £18,820 (*£10,672*), and contribution to employees' pension schemes. Transferred to general reserve, nil (*£75,000*), and after payment of £138,600 (*£135,850*) in dividends, there is £294,427 carried forward.

L. Sterne & Co., Ltd.

Trading profit for the year to October 31 last, of this prominent refrigeration manufacturing concern was £243,356, an increase of £3,137 on the previous 12 months. With dividends received added, the total is £255,954 (*£248,983*). The sum of £5,665 is allocated to interest on the bank overdraft, and £70,745 (*£61,167*) is placed to depreciation. Directors' emoluments absorb £19,370 (*£19,743*) and taxation £83,000 (*£78,500*), leaving a net profit of £77,174, an increase of £3,382 on the previous year. Preference dividend takes £5,940, and ordinary dividend 15% (*same*) on increased capital £12,870 (*£10,725*). With £15,000 placed to reserve for tax on initial allowances and £40,000 (*same*), there is £56,334 (*£52,970*) carried forward.

Vera Cruz Electric Light, Power and Traction Co.

For 1949, operating revenue amounted to £91,042 (*£92,020*). After allowing for operating deductions of £80,136 (*£81,890*), there is a balance of £10,906 (*£10,130*). The loss on abandonment of the diesel plant was £33,242, and the debit balance carried forward is £105,196 (*£63,644*).

Dividends Declared

H. J. Baldwin. Interim of 10% (*same*).
Morgan Crucible Co. Interim of 3¾% (*same*).
Scottish Cables Ltd. Interim of 10% (*same*).

Electric Supply News

Falkirk

The Town Council is to make representations to the British Electricity Authority regarding a proposal to erect an overhead power cable to the British Aluminium Co.'s works at Bainsford. The cables would pass the fringe of a housing scheme.

Lambeth

Following representations, the Borough Council last week decided that tenants at the Council's Studley Road housing estate shall have the choice of gas or electricity, reversing the previous decision (reported in our January 11 issue).

Leeds

The first of six 60 MW turbo-generators at Skelton Grange power station is expected to come into commission next month.

St. Davids

The non-statutory undertaking at St. Davids, Pembrokeshire, has been acquired by the South Wales Electricity Board.

Yorkshire

Dispute has arisen between the Yorkshire Electricity Consultative Council and the Area Board over the question of standardised tariffs. At the Council's December meeting (see ELECTRICAL TIMES, Dec. 21) a resolution was passed deploring the effect of the Yorkshire Electricity Board's proposed standardised domestic tariff, and asking the Board to reconsider the matter, bearing in mind its favourable financial position. As the Board has told the Council that it is intended to proceed with the scheme as planned, the Council, on January 24, decided, by 9 votes to 6, to appeal to the B.E.A. According to the resolution passed, the Council agreed that standardisation of tariffs is desirable, but the new tariff proposed, which would increase charges to 575,000 consumers and reduce them to 385,000, discloses a defect in the Board's general plans and arrangements. At the meeting last week, members contended that consumers should have some share in the Board's profits, which for the year to March 31, 1950, were £1,330,000. It was stated that under the scheme 575,000 consumers would pay about 3s. or 4s. p.q. more, with a similar reduction for the remainder. Mr. F. Newey, deputy chairman of the Board, explaining why the Council's request could not be met, said the Board's financial position would rapidly deteriorate unless there was a revision of tariffs. Big capital charges on new generating plant were now beginning to operate, more coal increases were impending, and recent wage increases would cost about £100,000.

LIGHTING SCHEMES

Brigg.—The U.D.C. proposes to convert street lighting to electricity, with the exception of Newlands estate.

Dover.—The Works Committee has recommended a scheme for ornamental lighting at East Cliff, at a cost of £800.

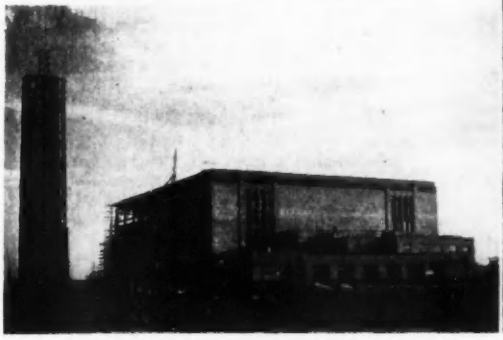
Edinburgh.—The Works Committee has proposed that about £1,500 be spent on the change-over from time switches on electric street and stair lights, to relays.

Felixstowe.—The U.D.C. has approved the provision of decorative lighting along the seafront, at a cost of £1,000.

Ilfracombe.—Assisted by a gift of £340 from the local carnival organisation, a sub-committee is to formulate a scheme of illuminations.

Morecambe and Heysham.—The Finance Committee is recommended to approve the expenditure of £46,000 on a scheme of illuminations.

Construction of the new Rye House generating station, Eastern Dvision of the B.E.A., is well advanced, as may be judged from our illustrations below. On the right is seen a turbine shaft for one of the six 32 MW Richardsons-Westgarth turbo-alternators, being lowered into position



Commercial Information

CONTRACTS OPEN

HOME

Feb. 2.—Belfast. Electricity Dept. invite supplies of various equipment and appliances including transformer kiosks, meters, l.t. fuse units, underground cable disconnecting boxes, washboilers, kettles and cooker boiling plates. Documents from the Dept., East Bridge St., Belfast. (See Jan. 11 issue.)

Feb. 2.—Bingley U.D.C. Installation of 400 W fluorescent mercury lighting units along about half mile of trunk road A650. Documents from F. M. Dunwell, Clerk of the Council, Town Hall.

Feb. 2.—Breconshire. Electrical installation at Cynlais infants' school, Ystradgynlais and Clydach school, near Abergavenny. Applications by above date to Harley C. W. Strickland, County Architect, Rhyd Offices, Brecon.

Feb. 2.—Southern Elect. Board. Conversion, alteration or adjustment of wireless equipment on Wimpey estate in the Heston district due to change-over from 240/280 V d.c. to 240 V a.c. Documents from S. H. Fowles, district manager, 11 Staines Rd., Hounslow, Middx. (See Jan. 18 issue.)

Feb. 3.—Swinton and Pendlebury T.C. Wiring and supply of electrical fittings for 100 houses being built at Clifton estate. Borough Engineer and Surveyor, Town Hall, Swinton, Lancs. (See Jan. 18 issue.)

Feb. 5.—Luton. Installation of electrical services at Whipperley county primary infants' school at Farley Hill. Borough Engineer, Town Hall.

Feb. 5.—Staines U.D.C. Supply and erection of concrete columns and brackets, of lanterns and fittings, for mercury vapour street lighting installation in Kingston Rd. (A308). Engineer and Surveyor, A. Hawley, 240 London Rd., Staines. Deposit £2 2s. (See Jan. 25 issue.)

Feb. 5.—Stoke-on-Trent. Installation of mercury discharge street lights, 281 concrete columns, lanterns and accessories. City Engineer and Surveyor, Town Hall. Deposit £3.

Feb. 5.—Peterborough. Lighting and heating at St. Nicholas children's home and nursery, South Parade. County Surveyor, County Offices. Deposit £2 2s.

Feb. 5.—Westminster. Supply of electric lamps, cable, etc., required for periods of 3, 6 or 12 months from April 1. Westminster City Hall, Charing Cross Rd., W.C.2.

Feb. 6.—Aberdeen. Electrical work in alterations and additions to Inoch school for C.C. Tawse and Allan, Architects, 343 Union Street.

Feb. 6.—Windsor R.D.C. Wiring of 20 houses at Kennel Ride, N. Ascot. Council's Building Surveyor, Council Offices, Bowden Rd., Sunninghill.

Feb. 7.—Edinburgh T.C. Electrical work at the Music Hall, George St. City Architect, City Chambers, Edinburgh.

Feb. 7.—Gt. Yarmouth. Twelve months' supply of cables. Borough Engineer, Town Hall, Gt. Yarmouth. (See Jan. 25 issue.)

Feb. 7.—Wrexham T.C. Columns and lanterns for group "B" street lighting. Details from J. M. Davies, Borough Engineer and Surveyor, 31 Chester St., Wrexham. (See Jan. 25 issue.)

Feb. 8.—Derby T.C. Supply and installation of small goods lift at Central Market, Morledge. Borough Architect, Council House, Corporation St., Derby.

Feb. 8.—Colne T.C. Erection in Birtwistle Ave. of eleven 60 W sodium discharge lamps with concrete columns and all ancillary equipment. Borough Engineer, Town Hall, Colne, Lancs.

Feb. 8.—Metropolitan Water Board. Electric lamps are among list of annual requirements for 12 months beginning April 1. Chief Engineer, Offices of Board, New River Head, Rosebery Ave., E.C.1.

Feb. 9.—Manchester. Electrical installation in Didsbury College. City Architect, Town Hall. Deposit £1 1s.

Feb. 10. — Banbridge R.D.C. Electric light installations in 12 houses at Lisnafiffy. D. W. Chambers, Architect, Town Hall. Deposit £2 2s.

Feb. 10.—Barry. Annual list of supplies for period ending March 31, 1952, includes electrical goods. J. Ll. Davies, Borough Engineer, Town Hall.

Feb. 10.—Biggleswade U.D.C. Supply and erection of 43 concrete columns, lanterns, 140 W sodium discharge lamps, auxiliary equipment and wiring on trunk road. T. Wilson, Engineer and Surveyor, Church St. Deposit £2 2s. (See Jan. 11 issue.)

Feb. 10.—Leeds. Supply and delivery of 660 V cables of various sizes, paper insulated lead-covered single wire armoured, for Knostrop sewage works. Length required is 3,150 lineal yards. Junction boxes and telephone wires also required. Sewerage Engineer, Civic Hall, Leeds 1.

Feb. 10.—Leigh T.C. Complete installation of approx. three miles of street lighting, comprising high-pressure mercury vapour discharge lamps mounted on concrete columns. John Walmesley, Borough Engineer and Surveyor, Town Hall, Leigh, Lancs.

Feb. 10.—Petworth (Sussex) R.D.C. Electrical wiring of 14 cottages at Plaistow. Building Surveyor, Newlands, Petworth.

Feb. 12.—Castle Ward (Northumberland) R.D.C. Electrical installation in 26 houses at Stamfordham. G. E. Dimmack, engineer and surveyor, North Rd., Ponteland. Deposit £2 2s.

Feb. 12.—Lancaster. Supply of 8 street lighting lanterns and lamps for Skerton Bridge, on A.6. City Engineer, Town Hall. (See Jan. 25 issue.)

Feb. 12.—Salford T.C. Annual stores including electric cable, lamps and solder. City Engineer, Town Hall, Salford.

Feb. 12.—Slough T.C. Electrical components included in list of annual supplies for period beginning April 1, 1951. E. Gardner Thorp, Borough Engineer, Town Hall.

Feb. 12.—Scunthorpe. Supply of electric lamps wanted for 12 months ending March 31, 1952. Borough Engineer and Surveyor, Comforts Av...

Feb. 14.—Dublin. Supply of four mobile tower ladders. City Engineer's Office, 28 Castle St. (Advertised in this issue.)

Feb. 14.—Gillingham T.C. Annual supplies for 12 months beginning April 1 include electrical switches, conduit, wire, cables, and all accessories; also electric cooker, wash boiler and fire spares, and electrical stores (lamps, etc.). Borough Engineer and Surveyor, Municipal Bldgs.

Feb. 14.—Prestwich T.C. (*a*) Supply, and (*b*) erection of 36 concrete lighting columns, (*c*) supply of 36 lanterns, (*d*) supply of 36 140 V sodium discharge lamps and control gear, and (*e*) installation of electrical equipment. Borough engineer, Town Hall, Prestwich. Deposit £2 2s. each.

Feb. 15.—Stoke-on-Trent. Biannual list of supplies wanted for period ending Sept. 30, 1951, includes electric lamps. City Surveyor, Town Hall.

Feb. 16.—Belfast. Supply and erection of mercury arc rectifier equipment. Electricity Dept., East Bridge St., Belfast. Deposit £2 2s. (See Jan. 25 issue.)

Feb. 17.—Cannock U.D.C. Electrical equipment is included in annual list of supplies for period ending March 31, 1952. Edwin Lomax, Engineer and Surveyor, Council House, The Green.

Feb. 19.—Skelton and Brotton U.D.C. Electrical wiring and installation of fittings in 20 houses on Brotton Coach Rd. estate. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland. (Advertised in this issue.)

Feb. 20.—Sligo C.C. Complete electrical installation in proposed conversion of the Girls' High School, Sligo, into a T.B. Hospital. Details from J. A. Kenny and Partners, consulting engineers, 44 Kildare St., Dublin. Deposit £15 15s.

Feb. 21.—Hertfordshire. Supply of electric lamps required for year ending March 31, 1952. Central Purchasing Officer, The Old Rectory, Hatfield.

Feb. 21.—High Wycombe T.C. Thirty-two concrete lighting columns, including lanterns for 250 W horizontal MV lamps, etc., for Hughenden Rd. Particulars from Borough Engineer's Dept., Municipal Offices, High Wycombe. Deposit £2 2s. (See Jan 25 issue.)

Feb. 21.—Rochdale. Installation of ventilating fans and ducting in Market Hall. Borough Surveyor, Town Hall.

Feb. 26 — Atherstone U.D.C. Supply and erection of street lighting equipment on trunk rd. A47 including concrete columns and lanterns. D. C. Smith, Engineer and Surveyor, Council Offices, Long St. Deposit £2 2s. (Advertised in this issue.)

Feb. 26.—Bedworth U.D.C. Supply and erection of automatic booster installation, comprising two electrically driven pumps of 60,000 g.p.h. with switchgear, etc., for Saunders Av. pumping station. C. S. B. Cooper, Water Engineer, Council Offices, High St.

Feb. 26.—Salford. Complete electrical installation at primary school in Summerville Rd. City Engineer, Town Hall, Bexley Square, Salford 3. (Advertised in this issue.)

Feb. 26.—Worsborough U.D.C. Supply and erection of 84 street lighting columns with 140 W sodium discharge lamp lanterns, etc. Henry C. Hand, Clerk of the Council, Council Offices, Saville House, Worsborough Bridge. (See Jan. 18 issue.)

Feb. 26.—Manchester. Electrical installation at Charlestown Infants' School in Pilkington Rd. City Architect, Town Hall. Deposit £1 1s.

Feb. 28.—Dewsbury T.C. Supply of electric lamps, cable, 100-200 W lanterns with swan neck brackets, 300-500 W lanterns, c.i. steel and concrete lighting standards, paint, glass, uniform jackets, etc. Street Lighting Superintendent, 27 Battye St., Dewsbury. (See Jan. 25 issue.)

Feb. 28.—Metropolitan Water Board. Manufacture and erection of 11,000 V and 415 V switchgear and motor control desks, and six transformers at Chingford South pumping station. Chief Engineer, Offices of the Board, New River Head, Rosebery Ave., E.C.1. Deposit £1 1s. (See Jan. 18 issue.)

March 7.—Dublin. Two complete sets of rectifier equipment, having output of 1,000 A at 500 V. Also supply of one 400 kVA transformer for Port and Docks Board. Engineer's Office, East Wall Rd., Dublin.

March 19.—North of Scotland H.E. Board. Forty miles of 132 kV steel tower o.h. line, between Beauly and Shin. Apply to Strain and Robertson, 154 West George St., Glasgow, C.2. Deposit £2 2s. (See Jan. 25 issue.)

No date stated.—Kirkcudbright C.C. Electrical installation in adaptation of Carlingwark House, Castle-Douglas, as a residence for old people. Apply to County Architect, County Offices, Kirkcudbright, by Feb. 3.

No date stated.—Whitby R.D.C. Electric wiring work at the Spa Theatre. Surveyor, Council Offices.

Your Queries — Answered

"Halite" packing, makers of? T.E.—We presume this enquirer refers to "Hallite" made by Hall and Hall Ltd., 88 Leadenhall St., E.C.3. (19364)

"Pyrex" insulators, makers of? W.E.—James A. Jobling & Co., Ltd., Wear Glass Works, Millfield, Sunderland. (19369)

"A.P.L." clocks, makers of? T.B. — Aircraft Patents Ltd., Myddleton Hall, Almeida St., N.1. (19373)

"Itonia" irons, makers of? D.S.—These were made by the Itonia Co., Ltd., a firm which went out of business about a year ago. We understand H. Chapman, 71 Goldsworth Rd., Woking, Surrey, can undertake repairs. (19377)

"Zephyr" hairdryers, makers of? T.B.—These were made by Apex Hairdressing Eqpt. Co., Ltd., 64 Frith St., London, W.1, but this firm can no longer be traced. Osborne Garrett and Co., Ltd., 51 Frith St., W.1. are able to undertake repairs. (19382)

FURTHER ANSWER

Neon indicating tubes, makers of? P.L.—Grafton, Kersten and Co., Ltd., 77 South Audley St., W.1; Philips Electrical Ltd., Century House, Shaftesbury Ave., W.C.2. (19339)

The above are selected from questions we have answered this week. If you have a query, send it to us.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Feb. 10.—S. Rhodesia. Dept. of Posts and Telegraphs invites tenders for 1,800 24 in. lead sleeves for telephone cable. Tenders to Secretary, P.O. Box 123, Causeway, Salisbury.

Feb. 16.—Uruguay. Materials are required for overhead high tension cables, comprising bare conductors, joining materials, materials for insulating suspension cables and steel cables and accessories. Administracion General de las Usinas Electricas y los Telefonos del Estado, Julio H. y Obes 1470, Montevideo. B.o.T. (Ref. CRE (IB) 74100/50).*

Feb. 21.—India. Govt. of Mysore, Stores Purchase Committee, invite tenders for supply of P.I.L.C. and V.C.I.L.C. power cables and accessories for Electrical Dept. Tenders to Secretary of Committee, United India Bldgs., Bangalore City.

Mar. 5.—Auckland (N.Z.). Electric Power Board require 25,000 yd of 0·075 sq in. and same of 0·0225 sq in. bare hard-drawn stranded cable. Also 40,000 yd of 0·075 sq. in and 50,000 yd of 0·04 sq. in weatherproof braided aerial cable. Power Board Bldg., Queen St., Auckland C.1.

Apr. 2.—Auckland (N.Z.). Electric Power Board want two 12,000 kVA transformers with on-load tap-changing equipment, automatic control equipment and spares suitable for connection to 21,000 V system. B.o.T. (Ref. CRE (IB) 51619/51).*

April 16.—Auckland (N.Z.). 3,250 yds 4-core l.t. cable, 2,500 yds of 6,600 V 3-core cable, 2,000 yds l.t. single-core cable, and 12,000 yds of 6,600 V cable, 15 sq in., required by Electric Power Board, Queen St., Auckland.

CONTRACTS PLACED

Metropolitan Water Board. Supply of 950 yds. of 0·4 sq. in. twin cable for Sunnyside pumping station, Aberdare Cables Ltd., £1,746, supply of 1,900 yds. of 0·2 sq. in. single-core cable for same, Scottish Cables Ltd., £1,120.

Swansea. Electrical installation at West Cross primary school, Hartley Electromotives Ltd., £4,336; same at East Penlan primary school, Lee Beesley and Co., Ltd., £4,646.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price*
COPPER, electrolytic	202 0 0	
Delivered in 2nd and 3rd month after order ...	215 10 0	
Delivered in 4th, 5th and 6th month after order	217 0 0	
LEAD, good soft pig (foreign)	136 0 0	
" " " "English" quality	137 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) ... ... ↓(Cash)	1350-1355	
" (3 months)	1310-1320	
ALUMINIUM, commercial purity (del.)	124 0 0	
ZINC	151 0 0	
ARMOURING:		
Galv. Steel Wire (0.104 in.)	45 10 0	
Mild Steel Tape (0.04 in.)	26 0 0	

* Dealings temporarily suspended, due to confusion over price control.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Leigh Electric Co., Ltd. Meeting of creditors will be held at 70 Victoria Rd. North, Southsea, on Feb. 19, at 2.30 p.m.

London. Malden-Brown (Electronics), Ltd., 9 Spring Grove, Loughton, Essex. Winding-up order made on Jan. 22.

The Wyeside Welding and Electrical Co., Ltd. Resolution for voluntary winding-up passed at a meeting on Jan. 17. Ernest Lockett, Wilson's Chambers, Commercial St., Hereford, has been appointed liquidator, to whom particulars should be sent by Feb. 10.

Intended Dividend

London. Ward Electrical Engineering Co., Ltd., 155 Wardour St., W.1. Last day for receiving proofs Feb. 7. Liquidator is A. E. Attwood, 20-21 Lawrence Lane, Cheapside, E.C.2.

BANKRUPTCY ACTS

Appointment of Trustee

Windsor. Edward W. Thorne, electrical engineer, lately trading at 123 King St., Maidenhead. Trustee is Richard Langdon Davis of 58 Theobalds Rd., W.C.1.

Receiving Order

Stockton-on-Tees. Ronald C. Alexander, trading as "Tees Electrical Installations Co." at 12 Mandale Rd., Thornaby-on-Tees. Date of receiving order, Jan. 23.

Release of Trustee

Leeds. Frar cis McMahon, electrician at Camden House Chambers, Leeds 2. Trustee was Walter Harold Meredith, Official Receiver, 29 East Parade, Leeds. Released on Jan. 22.

Intended Dividends

Newcastle-on-Tyne. Frederick Francis Chicken, radio dealer and electrical contractor, trading at 42-44 Newgate St., and Biltons Court, Morpeth. Last day for receiving proofs, Feb. 10. Trustee is T. G. Sparrow, deputy official receiver, Gibb Chambers, 54 Westgate Rd., Newcastle.

TRADE NOTES

Change of Address. Winlow Wilson (Worksop), Ltd., have moved to 50 Ashley Rd., Worksop. Telephone Worksop 2487.

New Phone No. The telephone number of Rich and Pattison (B'ham), Ltd., is now Midland 6714/8.

New Depot. Today, Feb. 1, Alliance Wholesale, Ltd. open a new depot at 5 Mote Rd., Maidstone, Kent. Telephone Maidstone 4558.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Baxtul. 692,004. Class 7. Flexible shaft portable power tools. Flexible Drive and Tool Co. Ltd., 17, QueensburyWay, South Kensington, S.W.7.

Dictocall. 689,312. Class 9. Audible and visual staff locating and calling apparatus, electric amplifiers, time recorders, burglar and fire alarms, loudspeakers, etc. Dictograph Telephones Ltd., Aurelia Rd., Croydon.

Difsec. 687,674. Class 11. Electrically heated apparatus for diffusing insecticides. Challoner-Dukes and Allison Ltd., 32 Ennismore Gdns., S.W.7.

Positionweld. 690,099. Class 9. Electrodes for electric welding. Lincoln Electric Co., Ltd., 45 Broadwater Rd., Welwyn Garden City, Herts.

BUSINESS PROSPECTS

HOME

Alnwick R.D.C. Council has been asked to build 50 houses for miners this year and 150 more during 1952.

Annan (Dumfries) T.C. It is proposed to erect 26 brick houses at estimated cost of £31,000.

Aylesbury T.C. Erection of 12 flats at Southcourt. R. C. White, Architect, 4 Temple Sq.

Banstead (Surrey) U.D.C. Erection of 68 houses and a block of 4 flats on Chipstead Rd. estate. A. W. Kenyon, Architect, 15 Adeline Pl., Bedford Sq., W.C.1.

Batley (West Riding). C.C. recommended to approve renewal of electrical installation at Park Rd. school. Estimated cost is £1,000.

Bishop's Stortford U.D.C. Erection of 16 houses and 16 bungalows on Apton Rd. estate. Engineer and Surveyor, The Council House.

Buckinghamshire. Applications invited from contractors wanting to add their names to the County Council's list. The relevant classes for the electrical industry are: (20) lifts; (23) refrigeration plant; and (24) electrical installations. Section numbers should be quoted. Applications to County Architect, County Offices, Aylesbury.

Burnham-on-Crouch (Essex) U.D.C. Erection of a public hall. Architect, Stanley Bragg, 16 London Rd., Chelmsford.

Chadderton U.D.C. Erection of 64 houses on Lower Bare Trees site. F. W. Pexton, Architect to the Council, Town Hall.

Cookham (Berks) R.D.C. Erection of 20 houses at White Waltham. James H. Beevis, Architect and Surveyor, Council Offices, 1 Bath Rd., Maidenhead.

Cowes (I.o.W.) U.D.C. Erection of 58 houses on Beatrice Av. site. Engineer and Surveyor, Northwood House, Cowes.

Durham. The Coal Board is to carry out a modernisation scheme at Easington colliery which will include electrification of the surface plant. Also the R.D.C. is to borrow £74,850 for erection of 64 houses at Leamside, and the Council is to build 75 houses at Sherburn and 60 at Framwellgate Moor.

Egham U.D.C. Erection of 46 houses on Thorpe Rd. estate. Engineer and Surveyor, Fire Station Bldgs., High St.

Felling-on-Tyne U.D.C. Council is obtaining estimates for supply of wiring and electrical fittings to be installed in new council houses.

Folkestone T.C. Erection of 36 flats in nine blocks on Bridge St. site, and 24 flats in six blocks on Biggins Wood site. Borough Engineer, Municipal Offices, West Terr.

Great Yarmouth T.C. Erection of a secondary technical school at Gorleston. F. Jackson, Schools Architect, 15 Regent St.

Harpenden U.D.C. Construction of 18 houses on Batford (North) estate. F. A. Harris, Clerk, Harpenden Hall, Harpenden.

Hartismere R.D.C. Erection of 24 houses on various sites. Council's Architect is Leslie Barefoot, The Thorofare, Ipswich.

Hoole (Cheshire) U.D.C. Construction of 24 houses on Linden Grove and Hoole House estates. Architect is R. Boot, 22 Newgate St., Chester.

Houghton-le-Spring U.D.C. Permission received to borrow £151,970 for erection of 96 houses on Cellarhill estate and 24 on the Fence Houses estate.

Hove T.C. Three contracts let for erection of a total of 70 flats on St. Helen's estate. Borough Surveyor, T. R. Humble, Town Hall.

Leeds T.C. Erection of dwellings at Belle Isle as follows, under separate contracts: 44 houses and 12 flats at Raylands Way; 84 houses and 8 flats at Cranmore Cres.; 22 houses at Cranmore Rise. Also 36 flats at Saxton Rd., Moortown; 12 at Lingfield View, Moortown; and 60 at Rosgill Drive, Seacroft. City Architect, Priestley House, Quarry Hill, Leeds 9.

Manchester. Permission has been received to build a new hotel at estimated cost of £250,000.

Middlesbrough T.C. Erection of 66 houses on Berwick Hills site. Borough Engineer and Surveyor, Municipal Offices.

Newcastle (Down). U.D.C. proposes to erect a public hall for entertainment purposes. Estimated cost, £25,000.

Ogmore and Garw U.D.C. Erection of 32 houses at Evanstown. Council's Surveyor, Council Offices, Brynmenyn.

Pontefract T.C. Erection of 50 houses on the Chequerfield estate. Borough Engineer, Municipal Offices.

Ryde T.C. Application made to borrow £16,510 for construction of houses on six sites and flatlets on another three sites.

Saltcoats T.C. It is proposed to build 30 houses.

Seaham U.D.C. Eighty houses are to be erected. Surveyor is A. M. Smith.

Skipton U.D.C. Erection of 20 houses on Horse Close estate. K. B. Robinson, Engineer and Surveyor, Town Hall.

Southampton T.C. Alterations to technical college, St. Mary's Institution. Borough Architect, Civic Centre.

Southwark. Plans approved for erection of 16 old people's dwellings on Comus Pl. site and 6 flats and 5 maisonettes on Kennington Park Rd. site.

Stonehaven (Kincardine). Plans approved for erection of 34 houses.

Wakefield (Yorks). C. C. recommended to approve re-wiring and improvement to lighting at 10, 12 and 14 St. Johns North. Cost is estimated, with other repairs, at £3,347.

Wednesbury T.C. Erection of 30 houses on Red House Grounds site. C. G. Morrish, Borough Engineer and Surveyor, Town Hall.

West Bridgford (Notts). U.D.C. proposes to spend £2,993 on improved lighting in Radcliffe Rd.

West Riding. Council recommended to approve £1,000 scheme for renewal of electrical installation at Park Rd. school, Batley.

OVERSEAS

Canada. J. B. Morrison Machinery Co. Ltd., 45 Orisle Parkway, Toronto, want to undertake representation of U.K. manufacturers of all types of fine measuring equipment except micrometers and hand tools.

U.S.A. Davenport Besler Corporation, 2305 Rockingham Rd., Davenport, Iowa, invite specifications and tentative prices from U.K. manufacturers of power units and such accessories as batteries and bearings suitable for all sizes of steam, electric and diesel locomotives. Interested firms should communicate with the President of the Corporation, Mr. Walter Chadwick.

MEETINGS TO NOTE

THURSDAY, FEB. 1

I.E.S. (Cardiff Centre).—Presidential address, L. J. Davies. S. Wales Elect. Board, The Hayes, Cardiff, 5.45 p.m.

I.E.S. (Exeter Group).—"Shop Window Lighting." T. S. Jones. Agricultural Hse., Queen St., 7 p.m.

ELECT. POWER ENGRS' ASSOC. (Midland Tech. Group).—"Television." I. N. Vaughan Jones. Walsall, 7 p.m.

I.E.E. (London).—"Standardisation and Simplification in Electrical Industry." J. T. Moore. "Organisation for Internal Standardisation in a Large Manufacturing Co." P. J. Daglish. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Rugby sub-centre).—Engineers Ball at Co-operative Hall, Rugby, 8 p.m.

INCORP. PLANT ENGRS. (Peterborough Branch).—Address by A. L. Berridge, manager of Peterborough power station. Eastern Gas Board, Church St., 7.30 p.m.

FRIDAY, FEB 2

I.E.S. (Bath and Bristol Centre).—"Shop Window Lighting." T. S. Jones. Grand Hotel, Bristol, 7 p.m.

I.E.S. (Huddersfield Group).—"Fringe Area Television," with demonstration. J. T. Thornton.

I.E.E. (S. Midland Centre).—Jubilee dinner at Grand Hotel, Birmingham, 6.30 p.m.

MANCHESTER ASSOC. OF ENGRS.—"Planning for Production Efficiency." Sir Claude D. Gibb. Engineers' Club, Albert Sq., Manchester, 6.45 p.m.

MONDAY, FEB. 5

I.E.S. (Leeds Centre).—"Analysis of Lighting Problems in an Industrial Undertaking." F. G. Copland, 24 Aire St., Leeds 1, 7 p.m.

I.E.S. (Sheffield Centre).—Presidential address. L. J. Davies. The University, Weston Bank, 6 p.m.

I.E.E. (Maidstone).—"Development of Industrial Switchgear." A. T. Crawford. New Inn, Sandling Rd., 7.30 p.m.

I.E.E. (Mersey and N. Wales Centre).—Discussion on "Electrical Control Gear." (Report of Anglo-American Council on Productivity.) Pillar Hall, Newry Pk., Chester, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"Determination of Time and Frequency." Humphry M. Smith. King's College, Newcastle, 6.15 p.m.

A.S.E.E. (Leeds Branch).—"Fractional H.P. Motors." J. W. Bottomley. Gt. Northern Hotel, Wellington St., 7.30 p.m.

A.S.E.E. (Sheffield Branch).—"Electric Lamp Manufacture." Royal Victoria Hotel, 7.30 p.m.

I.E.E. (S. Midland Centre).—"Planning of an Electricity Board's Distribution System." G. O. McLean. Jas. Watt Memorial Inst., Gt. Charles St., Birmingham, 6 p.m.

TUESDAY, FEB. 6

I.E.E. (N. Midland Students' Section).—"Textile Electrification." A. J. Francis. Lighting Service Bureau, 24 Aire St., Leeds, 7 p.m.

I.E.S. (Stoke-on-Trent Group) "Stage Lighting." E. Faraday. 31 Kingsway, 6 p.m.

WOMEN'S ENGRNG, SOC. (Manchester Branch).—"Gas Turbine—New Prime Mover." T. Mac Inerney. Engrs' Club, Albert Sq., Manchester 2, 6 p.m.

WOMEN'S ENGRNG SOC. (London Branch). — "Festival Lighting." Lighting Service Bureau, 2 Savoy Hill, W.C.2., 7 p.m.

INST. OF WORKS MANAGERS (Leicester Branch).—"Designing for Standardisation and Production." J. E. Chadbund of Brush Electrical. College of Technology, The Newark, 7 p.m.

I.E.E. (E. Midland Centre).—"Electrically Interlocked Guards on Machines." W. Fordham Cooper. Gas Showrooms, Nottingham, 6.30 p.m.

I.E.E. (N.W. Measurements Group).—"Determination of Time and Frequency." Humphry M. Smith, Engineers Club, Albert Sq., Manchester, 6.15 p.m.

A.S.E.E. (W. London Branch).—"Lighting Planning—Accuracy or Approximation." C. J. Misslebrook. Hammersmith Town Hall, 7.30 p.m.

WEDNESDAY, FEB. 7

N.W. FUEL LUNCHEON CLUB.—"Smokeless Zones." J. L. Burn. Engineers' Club, Albert Sq., Manchester.

I.E.S. (Edinburgh Centre).—"Effect of Artificial Lighting on Occupational Health." H. H. Bell. City Lighting and Cleansing Dept., High St., 7 p.m.

I.E.S. (Newcastle Centre).—"Street Lighting." A. J. Ogle. Durrant Hall, Oxford St., 6.15 p.m.

I.E.E. (London Radio Section).—"Radio-valve Life Testing." R. Brewer. Savoy Place, W.C.2, 5.30 p.m.

A.S.E.E. (N. London Branch).—"Mechanical Refrigeration and its Application." W. Boag. Three Jolly Butchers Hotel, Wood Green, 8.15 p.m.

A.S.E.E. (York Branch).—"High Frequency Heating." H. E. Anderson. Royal Station Hotel, 8 p.m.

I.E.E. (N. Lancs sub-centre).—"History of Lighting." R. Freestone. N.W.E.B., Darwen St., Blackburn, 7 p.m.

I.E.E. (Southern Centre).—Discussion on "Electrical Equipment in Motor Cars." B.E.A. House, Portsmouth, 6.30 p.m.

THURSDAY, FEB. 8

DUNFERMLINE ELECT. SOC.—"Electricity Applied to Farming." A. Cameron Brown. Unitas Hall Queen Anne St., 7 p.m.

I.E.S. (Glasgow Centre).—"Effect of Artificial Lighting on Occupational Health." H. H. Bell, Inst. of Engrs. and Shipbuilders, Elmbank Crescent, Glasgow, 6 p.m.

I.E.S. (Manchester Centre).—"Scientific Relationship between Illumination and Photography." L. H. A. Carr. Coll. of Technology, Sackville St., Manchester 1, 6 p.m.

INSTN. OF WORKS MANAGERS (Wembley Sub-branch). — "The Study of the Mind." I. H. Child of B.T.H. "The Plough," Kenton Rd., Kenton, 12.30 p.m.

I.E.E. (N. Midland Centre).—"Application of Gas Turbine Technique to Steam Power." J. F. Field. The University, Leeds, 7 p.m.

I.E.E. (N.E. Scotland sub-centre).—"Fault Location on High Voltage Lines by an Electronic Method." D. W. Berry. Royal Hotel, Union St., Dundee, 7 p.m.

I.E.E. (Swansea Sub-centre).—"Polyphase Commutator Machines." B. Adkins and W. J. Gibbs. Plaza Cinema, 6 p.m.

NEW COMPANIES

Extracted from the Register issued by Joraan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Dolphin Engineering Co. Ltd. Mechanical, electrical, heating, plumbing, refrigeration, building, constructional, mining and general engineers, etc. Cap.: £2,000. Dirs.: to be appointed by subscribers. Subs.: P. O. Ansell, 54 High View Gdns., Potters Bar, Middx.; A. Matthews, 30 Knoll Drive, Southgate, N.14.

Tru-Spot Ltd., 14/18 High Holborn, W.C.1. Manufacturers of and dealers in electric torches, flashlights, incandescent lamps, etc. Cap.: £100. Dirs.: to be appointed by subscribers. Subs.: J. D. Eccles, 5 Wilbraham Place, S.W.1; Mary Green, 53 Wentworth Av., Finchley, N.3.

Ward Electric Co. (Norwood) Ltd., 44 Chapel Rd., West Norwood, S.E. To take over business carried on at West Norwood, by Violet M. Howard, and to carry on business of engineers, etc. Cap.: £2,000. Dirs.: Violet M. Howard, C. W. Mills, and D. A. Davies.

Television Installation Services (Mansfield) Ltd., 20 White Hart St., Mansfield, Notts. To take over business of manufacturers of and dealers in radio, television, gramophone and electrical equipment carried on at Mansfield, Notts., by Harold Lewis, Wm. E. Laughton, and Reginald J. Wright. Cap.: £3,000. Dirs.: H. Lewis, W. E. Laughton, and R. J. Wright.

East meets West

Henley Telephone Cable seen here arriving at Calcutta is another reminder of our long association with India. The drum is part consignment of a contract for the Government of India valued at over £300,000.

BY APPOINTMENT
ELECTRIC CABLE
MANUFACTURERS

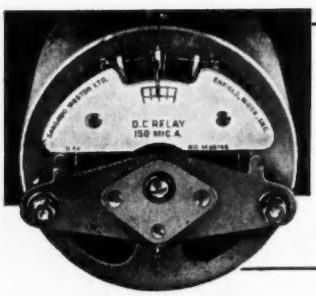
Let **HENLEY CABLES** *carry the current*

W.T.HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON. E.C.1

FEATURES OF WESTON SUPERIORITY

Weston
MOVING COIL RELAYS

This modern range of relays is ideal for all Laboratory or Industrial Purposes. Built on the permanent-magnet moving coil principle, unaffected by external magnetic fields, the precious metal contacts will not oxidise or tarnish, and the high torque developed ensures positive contact pressure. Supplied in Bakelite casing. Most applications call for special requirements and enquiries should therefore enclose a diagram of the circuit to be closed and state (a) High and/or low contact adjustment; (b) mounting position; (c) resistance; (d) values of current and voltage in local circuit and whether DC or AC; (e) values of resistance and any inductance or capacitance in local circuit; and (f) any special accuracy required. Every 'Weston' relay is specially designed to give the best possible performance for its individual purpose. (The Model illustrated is S54.)



ACCURACY OF ADJUSTMENT. Special note should be made of the reduction gearing which enables the *user* to make accurate adjustment with absolute ease. The accuracy and rigidity of the mounting ensures constant centring after adjustment. Yet another special 'Weston' feature.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX: Telephone: Enfield 3434 (6 lines) & 1242 (4 lines) Telegrams: Sanwest, Enfield.

BRANCHES: GLASGOW, MANCHESTER, NEWCASTLE-ON-TYNE, LEEDS, WOLVERHAMPTON BRISTOL, SOUTHAMPTON, BRIGHTON LIVERPOOL AND NOTTINGHAM

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

ATHERSTONE RURAL DISTRICT COUNCIL

Parish of Ansley

STREET LIGHTING ON TRUNK ROAD A.47

TENDERS are invited for the supply, delivery and erection of Street Lighting Equipment on the above road. The mounting height of the source of illumination to be 25 feet above the carriageway and the lanterns attached to reinforced concrete lamp columns.

The form of tender, specification and bills of quantities may be obtained from D. C. Smith, Esq., Engineer and Surveyor, Council Offices, Long Street, Atherstone, on receipt of a deposit of £2 2s. which will be returned on receipt of a bona fide tender not subsequently withdrawn. Plans may also be viewed at the same office. The acceptance of a tender is subject to the approval of the Ministry of Transport.

The Council does not bind itself to accept the lowest or any tender nor to defray the cost incurred by any person in the preparation thereof.

Tenders must be received by the undersigned not later than noon on February 26, 1951, in plain sealed envelopes endorsed "Street Lighting Route A.47."

G. CARLYON MAY,
Clerk of the Council.

Council Offices,
Long Street, Atherstone, Warwickshire. (H 541)

SKELTON AND BROTTON URBAN DISTRICT COUNCIL

TENDERS FOR ELECTRICAL WIRING, ETC.

THE Council invite tenders for the electrical wiring and installation of electrical fittings in respect of 20 houses on their Brotton Coach Road estate.

Plans may be inspected and specification and form of tender obtained at the office of the Engineer and Surveyor, Council Offices, Skelton-in-Cleveland.

Tenders enclosed in plain sealed envelopes endorsed "Electrical Installations," must be delivered to the undersigned not later than 10 a.m. on Monday, February 19, 1951.

The Council do not bind themselves to accept the lowest or any tender.

F. WILKINSON,
Clerk of the Council.

Council Offices,
Skelton-in-Cleveland, Saltburn, Yorks.
January 24, 1951. (H 484)

STAINES URBAN DISTRICT COUNCIL

STREET LIGHTING

THE Council invites tenders for a mercury vapour street lighting installation to Group A standard in Kingston Road (A 308), Staines, as under:

(a) Supply of reinforced concrete columns and brackets, together with the erection of columns, brackets, lanterns, wiring of columns and lanterns and gear.
(b) Supply of lanterns and fittings.

Plans and conditions of contract may be seen at, and form of tender, specification and bills of quantities, can be obtained from the office of the Engineer and Surveyor, Mr. A. Hawley, F.R.I.C.S., 240 London Road, Staines, on payment of two guineas deposit which will be refunded on receipt of a bona fide tender and return of all documents.

Tenders in plain sealed envelopes endorsed "Street Lighting—Kingston Road," must be delivered to me not later than midday on February 5, 1951.

The Council does not bind itself to accept the lowest or any tender.

F. ENTWISTLE,
Clerk of the Council.

Clarence Street, Staines.
January, 1951. (H 403)

CORPORATION OF DUBLIN

TENDERS are invited for the supply of Four Mobile Tower Ladders.

Tender form, specification, etc., may be obtained from the City Engineer's Office, 28 Castle Street, Dublin.

The lowest, or any tender, will not necessarily be accepted.

The latest date for receipt of tenders is 12 noon, Wednesday, February 14, 1951.

JOHN P. KEANE,
Deputy City Manager and Town Clerk.

City Hall, Dublin.
January 22, 1951. (H 499)

CITY OF SALFORD

TENDERS are invited by the first post, Monday, February 26, 1951, for the complete electrical installation at the proposed Primary School, Summerville Road, Salford 6.

Specification and tender form may be obtained on application to the City Engineer, Town Hall, Bexley Square, Salford 3.

H. H. TOMSON,
Town Clerk.
(H 523)

APPOINTMENTS VACANT

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Southern Sub-Area

APPLICATIONS are invited for the following appointment:—

GENERAL ASSISTANT ENGINEER (CONSTRUCTION)

Class "G," Grade 13 (£433-£441-£449). Applicants should be able to survey, profile and schedule h.v. and l.v. wood pole lines and negotiate wayleaves.

Applicants for the above vacancy must have had a sound practical training and preference will be given to those holding the Higher National Certificate or equivalent.

The appointment will be superannuable under the B.E.A. and Area Boards' Superannuation Scheme.

Applications, stating age and particulars of education, training, experience and positions held, should reach the undersigned not later than 14 days after the appearance of this advertisement.

G. H. SANKEY,
Sub-Area Manager.

High Street,
Galashiels. (H 537)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ADMINISTRATIVE OFFICER in the Central Sub-Area of the Board based on Cardiff.

Applicants should have had an extensive experience in general administration, personnel and establishment work and in office organisation. Experience of these matters within the supply industry will be an advantage.

The salary for the position will be at the rate of £900 per annum until such time as the final grading is determined by the appropriate negotiating machinery.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, near Cardiff, so as to reach him not later than February 14, 1951.

D. G. DODDS,
Secretary.
(H 534)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments at the Peterborough Generating Station:—

STATION SHIFT CONTROL ENGINEERS
BOILER SHIFT CONTROL ENGINEERS

The salary for these appointments will be in accordance with the revised N.J.B. Schedule, Grade 10, Class "D." (£465–£481 per annum); shortly rising to Grade 10, Class "F." (£510–£530 per annum).

The salary is, however, provisional and is subject to ratification by the National Joint Board.

Applicants should have reached the standard of the Ordinary National Certificate in Electrical Engineering, or its equivalent, and had experience in the operation of a switchboard at a generating station and be fully conversant with high-tension switching operation and protective systems. Experience in the operation of pulverised fuel-fired steam-raising plant will be an advantage.

The successful applicants will be required to interchange the duties of Station Shift Control Engineer and Boiler Shift Control Engineer.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 16, 1951. Envelopes should be endorsed with the appointment sought.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (H 519)

BOROUGH OF DOUGLAS, ISLE OF MAN

ELECTRICITY UNDERTAKING

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER in the Corporation's generating station.

Applicants should have experience in the operation of a modern steam generating station, and be prepared to undertake maintenance duties. Preference will be given to candidates with experience in modern p.f. fired boilers and possessing technical qualifications up to National Certificate standard.

The salary will be in accordance with Class "C," Grade 8 of the Isle of Man Joint Board schedule, at present £494, rising to £514.

The appointment will be an established post under the superannuation scheme of the Corporation, and the successful candidate will be required to contribute to the Council's superannuation fund and pass a medical examination.

Particulars of superannuation scheme, income tax and living conditions in the Isle of Man may be obtained upon application to the Town Clerk, Town Hall, Douglas, Isle of Man.

Applications, endorsed "Shift Charge Engineer," giving particulars of age, qualifications, experience and earliest date available, together with three recent testimonials, should be addressed to the Borough Electrical Engineer and Manager, Electricity Offices, Ridgeway Street, Douglas, Isle of Man, not later than February 12, 1951.

PERCY M. SHIMMIN,
Town Clerk.

Town Hall,
Douglas, Isle of Man.
January 24, 1951. (H 521)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT SECTION ENGINEERS

APPLICATIONS are invited for positions as Assistant Section Engineers in the Transmission Department within the East Midlands Division.

Applicants should have received a first class technical education and should be Corporate or Graduate Members of the I.E.E., and must have had experience in the maintenance and operation of high voltage overhead lines and outdoor transformer and switching stations. Experience of 132 kV equipment would be an advantage.

Commencing salary will be in accordance with Grade 6, Schedule "C" of the N.J.B. Agreement (£516 to £707 per annum), and will commence at a point commensurate with qualifications and experience. The post will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be made on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned to him not later than February 12, 1951.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate,
Nottingham. (H 445)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

SENIOR ASSISTANT ENGINEERS

APPLICATIONS are invited for appointments as Senior Assistant Engineers in the Technical and Planning Sections of the Chief Engineer's Department at Area Board Headquarters. The salary will be in accordance with the N.J.B. Schedule, initially Class "AX," Grade 1, within the range £884 to £1,015, and subsequently according to the classification of the area, which is approaching Class "DX."

Applicants should be Chartered Electrical Engineers with good technical qualifications. They should have experience of the design, construction and operation of distribution systems, and will be required to undertake work on their own responsibility.

The Senior Assistant Engineer (Technical) should be capable of dealing with technical investigations, and should have experience in some of the following branches: metering practice and testing, protective gear application and testing, design of relay and control circuits for switchgear, sub-station commissioning procedure, supervisory and remote control, communications and electronics.

The Senior Assistant Engineer (Planning) should have a good knowledge of the technical and economic factors involved in system design. Experience in system layout and design at all voltages up to 33 kV, and in the preparation of complete distribution schemes and estimates, is desirable.

Applicants will be required to satisfy the Board's medical adviser and to contribute to a superannuation scheme.

Application forms should be obtained from the Establishments Officer, Merseyside, and North Wales Electricity Board, Electricity House, Love Lane, Pall Mall, Liverpool 3, and should be returned to him, endorsed "Engineering Staff," not later than Monday, February 19, 1951.

JAMES RANKIN,
Secretary.
(i 535)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

SECOND ASSISTANT ENGINEER (ELECTRICAL)
GENERATION (CONSTRUCTION) DEPARTMENT

APPLICATIONS are invited for the appointment of Second Assistant Engineer (Electrical) in the Generation (Construction) Department. The appointment will be located initially at Group Headquarters, Drighlington, near Leeds, and subsequently in Leeds.

Applicants should have educational and engineering qualifications up to the standard required for Associate Membership of the Institute of Electrical Engineers, and should have experience in planning, specifying, executing and commissioning of the electrical works in power stations.

The commencing salary will be within Grade 2 of Schedule C of the National Joint Board Agreement, i.e. £752–£884 p.a., according to qualifications and experience, rising ultimately to a maximum of £968 p.a. The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed "Second Assistant Engineer (Electrical)."

G. A. VOWLES,
Divisional Controller.
(H 486)

ADMIRALTY

VACANCIES exist for PRODUCTION INSPECTORS at various Admiralty Establishments and in shipbuilding and industrial centres in various parts of the country.

The duties involve work in connection with the manufacture, inspection, test and installation of a wide variety of mechanical and electrical equipment for H.M. ships. For certain of the posts experience of electronic, including radar, apparatus will be advantageous.

Candidates, who must be at least 25, should have served a recognised engineering apprenticeship or have had equivalent training, followed by at least three years' relevant experience in industry or Government service. They should preferably be in possession of Higher National Certificate or equivalent; a lower qualification such as Ordinary National Certificate might, however, be considered.

Appointments will be unestablished, but there may be opportunities at a later date of competing for permanent posts. The salary scale is £500 by £20 to £625 per annum and entry will be at the minimum, subject to a deduction of £20 for each year by which the age of entry falls short of 30. Rates outside London are a little lower.

Write, quoting D33 51-A, to the Ministry of Labour and National Service, Technical and Scientific Register, (K) York House, Kingsway, London W.C.2, for application form which must be returned completed by February 24, 1951. (H 507)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the City District.

Applicants should be Corporate Members of the I.E.E. or hold equivalent qualifications and should have had extensive experience in system operation load control, installation and maintenance of both a.c. and d.c. rotary and motor converting plant, fault location on 3-phase a.c. systems up to 11 kV and 3-wire d.c. systems, and the organisation and control of staff and manual employees.

The post is graded under the National Joint Board agreement of February 17, 1950, as Class "F," Grade 5 (corresponding with Schedule B designation "First Assistant District Engineer"). Salary range: £746 11s. to £786 9s. per annum inclusive of London Area Allowance. This grading is subject to the approval of the District Joint Board and confirmation by the National Joint Board.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, on receipt of addressed foolscap envelope, to be returned duly completed within seven days. Please quote ref. : EST/V/1086/T on envelope and all correspondence. (H 536)

MIDLANDS ELECTRICITY BOARD

Wolverhampton & District Sub-Area

APPOINTMENT OF GENERAL ASSISTANT ENGINEER—CANNOCK DISTRICT

APPLICATIONS are invited for the above appointment in the Cannock District of the Wolverhampton and District Sub-Area.

Applicants should have had experience in distribution work, including operation and maintenance of h.v. and l.v. underground cables, sub-stations, etc. Appropriate technical qualifications will be considered an advantage.

The conditions of service will be in accordance with N.J.B. Agreement and the salary subject to negotiation will be Class "E," Grade 11—£459/£467/£475.

Applications, in writing, stating age, qualifications, experience and present salary, should be forwarded within seven days to: Mr. F. J. Elliott, Manager, Midlands Electricity Board, Wolverhampton and District Sub-Area, 83 Darlington Street, Wolverhampton.

A. STEPHENS,
Secretary.
(H 538)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER at Stoke Generating Stations, Class "E," Grade 7, commencing salary £579 per annum.

Applicants should have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear, or mechanical and electrical experience in a manufacturer's works. Qualified marine engineers with electrical experience would be considered suitable.

Salary and conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than February 17, 1951.

F. W. LAWTON,
Divisional Controller.
(H 485)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Clyde Sub-Area

APPOINTMENT OF DISTRICT ENGINEER

APPLICATIONS are invited for the appointment of District Engineer in the Paisley District. Candidates should have had a sound training in electrical engineering and considerable experience in the operation and maintenance of high and low voltage networks (overhead and underground) and sub-stations, the supervision of constructional work and the keeping of essential records of mains and sub-stations equipment and layouts.

The salary will be in accordance with the revised National Joint Board Schedule, Class "E," Grade 2, £856/£896 per annum. Candidates should preferably be corporate members of the Institution of Electrical Engineers or have equivalent qualifications. The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, education, qualifications and experience, present position and salary, should be received by the Manager, 206 St. Vincent Street, Glasgow, within fourteen days of the appearance of this advertisement.

DANIEL ROSS,
Manager.
(H 500)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SECOND ASSISTANT ENGINEER

APPLICATIONS are invited from qualified engineers for an appointment as Second Assistant Engineer in the Generation (Operation) Department.

The selected candidate will be required to assist the Generation Engineer in the control and operation of a group of power stations based on Nottingham.

Applicants should have served an engineering apprenticeship and should have an extensive experience in all phases of operation and maintenance of modern high pressure generating plant.

Salary will be within Grade 2 of Schedule C of the National Joint Board Agreement (£752-£968 per annum). The position is superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than February 19, 1951.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (H 501)

MIDLANDS ELECTRICITY BOARD

North Staffordshire Sub-Area

APPOINTMENT OF ASSISTANT CONSUMERS ENGINEER

APPLICATIONS are invited for the position of Assistant Consumers Engineer in the Stoke-on-Trent North District of the North Staffs Sub-Area.

Applicants should have had a sound technical training and practical experience of industrial and domestic loads, and in particular contracting work, including maintenance of consumer service. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with N.J.B. conditions and the salary subject to negotiation will be Class "E," Grade 8, £550-£560 p.a. The successful applicant will be required to contribute to the Board's Superannuation Scheme, if eligible.

Applications, stating age, experience and present salary, should be forwarded within 14 days to Mr. H. A. P. Caddell, Sub-Area Manager, Midlands Electricity Board, North Staffs Sub-Area, York Chambers, 31 Kingsway, Stoke-on-Trent, Staffs.

A. STEPHENS,
Secretary.
January 19, 1951. (H 487)

YORKSHIRE ELECTRICITY BOARD

No. 7 (Grimsby) Sub-Area

APPLICATIONS are invited for the following appointment:—

FOREMAN OVERHEAD LINESMAN—Grimsby
(Vacancy No. 11/51)

Applications are invited for the above appointment from persons fully experienced in, and capable of supervising, the erection and maintenance of H.V. overhead lines.

The rates of pay and conditions of service will be in accordance with the National Joint Industrial Council Schedule for the Electricity Supply Industry, the present rate of pay for a 44-hour 5-day week being 3s. 2d. per hour.

Applications, stating the above vacancy number, and giving full details of age and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement. (H 533)

SOUTHERN ELECTRICITY BOARD

INSTALLATION ASSISTANT, READING

APPLICATIONS are invited for the post of Installation Assistant, Reading, No. 2 (Newbury) Sub-Area.

Qualifications: Applicants should have sound experience in preparation of specifications and estimates for all types of electrical wiring installations, particularly industrial work, and should be competent to supervise electricians or organise allocation of work, and generally assist Installation Supervisor.

Salary and conditions: Salary in accordance with N.J.B. Class "F," Grade 11/1 (£482 per annum), N.J.B. Conditions of Service. The successful candidate will, if eligible, be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme.

Applications, on forms to be obtained from the Sub-Area Secretary and returned to him at 7 Oxford Road, Newbury, in envelopes endorsed "Installation Assistant, Reading," not later than 14 days after the appearance of this notice.

F. W. KEMPTON,
Secretary.
(H 531)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment in the Generation Construction Department at Divisional Headquarters:—

GRADE I DRAUGHTSMAN (MECHANICAL)

The commencing salary will be within the range of £519 to £636 per annum which includes London Weighting.

Applicants should be in possession of the Higher National Certificate or equivalent and preferably have served a recognised apprenticeship course. They should be familiar with one or more of the following:—

Generating station layout and design, coal handling plant, Ash and Dust handling system and Pipework systems.

The salary is provisional and will be subject to negotiation through the medium of the appropriate negotiating body.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent in envelopes endorsed "Grade I Draughtsman (Mechanical)," to arrive not later than February 16, 1951, to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (H 532)

BRITISH ELECTRICITY AUTHORITY

Southern Division

SENIOR ASSISTANT TO THE ESTATES AND WAYLEAVE OFFICER

APPLICATIONS are invited from suitable qualified persons for the position of Senior Assistant to the Estates and Wayleaves Officer.

Candidates should have a sound knowledge of all estate and land agency duties and be conversant with the present procedure under the Town and Country Planning and Agricultural Acts. They must also have had extensive experience in the negotiating of easements, including the negotiations with public and other authorities.

The terms and conditions of appointment will be those approved by the National Joint Council and the salary will be in accordance with Grade 6, namely, £630 rising to £705 per annum.

The post is superannuable and may be subject to a satisfactory medical examination.

Applicants should preferably be in possession of a motor car, for which an appropriate allowance will be paid in accordance with the scale now in force.

Forms of application may be obtained from the undersigned and must be returned not later than Friday, February 9, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (H 522)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

THIRD ASSISTANT ENGINEER

APPLICATIONS are invited for the position of Third Assistant Engineer in the Transmission Department at this Divisional Headquarters.

Applicants should have had previous experience in setting out, construction, inspection and checking of overhead e.h.t. lines in the field and in the preparation of profiles. Corporate or graduate membership of the I.E.E. or equivalent qualifications will be considered an advantage.

The salary for this appointment will be in accordance with Class "AX DX," Grade 5 of Schedule C of the National Joint Board Agreement(£579 to £776 per annum).

The appointment will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than February 19, 1951.

W. S. BURGE,
Divisional Controller.

British Electricity Authority,
British Electricity House,
Nottingham. (H 520)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

SINGAPORE MUNICIPALITY

Electricity Department

CHARGE ENGINEERS. Permanent Staff, required for shift duties in the Singapore power station. Present capacity 37,000 kW with proposed extensions to 87,000 kW.

Experience of extra high tension 3-phase generation in a modern high pressure steam power station required. Appointment subject to medical examination.

Basic salary scale $440 to $870 per month. Starting point according to qualifications and experience. Graduated scale of allowances, e.g. present allowances on $590 p.m. basic salary amount to: expatriation $110 p.m. plus cost of living $198 p.m. for single man or $256.50 p.m. for married man or $334.50 p.m. for married man with family. One Straits dollar equals 2s. 4d. Thus a married man with family on basic salary of $590 would draw equivalent of £1,448 sterling per annum.

Quarters with heavy furniture provided at 8 per cent. of salary or housing allowance in lieu. Initial engagement on three years' agreement. Eight months leave after four years service. Free medical attention. Passages paid including family (children under 17). Compulsory provident fund contribution 7½ per cent. of salary and municipal commissioners donate 7½ per cent. for first 10 years rising to 20 per cent. after 20 years' service.

Applications, in duplicate, with full personal and technical information and copies of three testimonials, to Messrs. Peirce and Williams (Agents to the Municipal Commissioners), 1 Victoria Street, London S.W.1. (H 430)

UNIVERSITY OF LIVERPOOL

APPLICATIONS are invited for the post of ASSISTANT LECTURER in the Department of Electrical Engineering (Electro-Technics), at an initial salary of £450 per annum, with allowance for age and qualifications. Experience in the generation, transmission and distribution of electrical energy, design of electrical machinery, electric traction and advanced electrical technology would be advantageous.

Applications, stating age, academic qualifications and experience, together with the names of three referees, should be received not later than February 24, 1951, by the undersigned, from whom further particulars of the conditions of appointment may be obtained.

STANLEY DUMBELL,
Registrar.

January, 1951. (H 370)

A SALES MANAGER required for retail sales dept. substantial electrical business Cambridge. Must be good organiser having initiative, capable taking charge without supervision. Permanent post with excellent prospects for right man. Liberal salary. Replies treated in strict confidence.—State experience, age. Box No. 3031, Electrical Times. (H 510

APPLICANTS are invited for the post of RESIDENT-ENGINEER to take charge of Contracts for Erection and Commissioning of hydro-electrical equipment in Portugal. Only engineers with substantial experience of large-scale overseas responsibility for this class of work will be considered. Contracts in Portugal will be of some years' duration, but on completion continued similar employment will probably be available at home or overseas.—Apply, giving full details and quoting Ref. 838 to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (H 238)

ASSISTANT ELECTRICAL DESIGNER required with good experience in the design of induction motors. The position offers good prospects, good working conditions with superannuation scheme. Assistance in regard to housing will, if necessary, be given.—Applications treated in strict confidence should state details of general and technical education, together with practical design experience, to Ref. WN, Crompton Parkinson Ltd., Guiseley, Nr. Leeds. (H 417)

ASSISTANT ELECTRICAL ENGINEER required by oil company operating in Persian Gulf. Should possess electrical Degree or Higher National Certificate in electrical engineering, and should have had experience in installation and maintenance of (a) h.t. and l.t. motors and associated switchgear, (b) industrial power and lighting installation. Some mechanical experience on pumps and compressors is desirable. Age under 35. Salary starting £830 p.a. clear. Free messing and accommodation or an allowance in lieu. Pension scheme. Kit allowance.—Write, giving details and quote K.1202, to Box "R.N.," c/o J. W. Vickers and Co., Ltd., 7-8 Great Winchester Street, London E.C.2. (H 511)

CABLE CONTRACTS ENGINEER required to handle large projects for installation, laying and jointing of cables up to highest voltages. Applicants must be capable of estimating and supervising excavations and measured work and of controlling labour. Excellent opportunity of advancement for successful candidate.—Applications to Box No. 3033, Electrical Times. (H 525)

ASSISTANT MAINS ENGINEER required by major Persian Gulf oil company. Should possess B.Sc. degree or diploma of a recognised college, or be A.M.I.E.E. or graduate I.E.E. with experience on e.h.t. and l.t. mains and substation gear. Duties include assisting in the design, development and supervision of e.h.t. and l.t. mains and distribution schemes, both overhead and underground and substation construction and maintenance. Previous experience with large public electric supply company desirable. Age under 30. Salary starting £830 p.a. clear. Free messing and accommodation or allowance in lieu. Pension scheme. Kit allowance.—Write, giving details and quoting K.1201, to Box "O.P.," c/o J. W. Vickers and Co., Ltd., 7-8 Great Winchester Street, London E.C.2. (H 512)

BRITISH Railways (Southern Region). ELECTRICAL ENGINEERING ASSISTANTS are required for power supply and distribution. Applicants should not be more than 30 years of age and should have reached Matriculation standard in general education. Applicants should also have sound technical training and have reached a standard of not less than that of the Higher National Certificate in Electrical Engineering or equivalent. Practical engineering workshop training will be an advantage. Commencing salary £255 to £480 per annum according to age.—Applications, in writing, to be addressed to Mechanical and Electrical Engineer, 15 St. Thomas Street, London Bridge, S.E.1. (H 454)

CABLE (Rubber) Sales Dept. of C.M.A. Company in London has vacancy for ASSISTANT. Applicants should have knowledge of cable business and experience in dealing with quotations and correspondence.—Write, stating age, experience and salary required, Box No. 3027, Electrical Times. (H 508)

CHIEF DRAUGHTSMAN, Divisional Headquarters. Works and drawing office training with manufacturers of heavy civil, mechanical or electrical power station plant and considerable experience in the design and layout of such plant essential. Corporate Membership of one of the major engineering institutions desirable. N.J.B. Conditions of Service. Provisional salary £750 to £975 plus London Allowance.—Application forms obtainable from Divisional Secretary, British Electricity Authority, South Eastern Division, Lower Ham Road, Kingston-upon-Thames, to be returned by February 10, 1951. (H 529)

CHIEF DRAUGHTSMAN required, capable of taking charge of a London drawing office employing 12 draughtsmen engaged on work in connection with overhead electric transmission lines and structural steelwork. Applicants, who should preferably be aged about 35, would also be required to supervise photoprinting and drawing office records work. Five-day week, staff canteen, pension fund.—Applications, which should include details of qualifications, experience and salary required, should be addressed to Staff Office, British Insulated Callender's Construction Co. Ltd., 21 Bloomsbury Street, London W.C.1. (H 483)

DESIGNER required by well-known firm of electrical engineers in the west of Scotland, with experience in the design of totally enclosed A.C. motors of from 5 to 100 h.p. Technical qualifications—Higher National Certificate, University Degree or Diploma in Electrical Engineering.—Applications, stating age, qualifications, experience and salary required to 2416 Wm. Porteous and Co., Glasgow. (H 517)

DRAUGHTSMEN. Britain's leading design consultants and contractors require urgently Senior Switchgear Draughtsmen, also Juniors to train as Switchgear Draughtsmen. Good salaries and prospects of advancement for suitable applicants. Pension scheme.—Write in confidence, quoting reference E.T., to John A. Smith Ltd., 24 Lichfield Street, Wolverhampton. (H 335)

DRAUGHTSMEN AND ENGINEER DESIGNERS required, preferably with experience in any branch of high tension and low tension electrical switchgear or electrical control gear, also applications from good mechanical draughtsmen and designers are invited.—Apply, quoting "Switchgear," to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (H 442)

DRAUGHTSMEN with experience of switchgear and/or rectifier design required by Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames. Pension scheme. Five-day week.—Write, giving past experience, technical education and salary required, to Chief Mechanical Engineer. (H 482)

DRAUGHTSMEN with experience on all sizes of power transformers required by company in S.W. London. Pension scheme in operation and five-day week. State full details, past experience, technical education and salary required.—Box No. 3019, Electrical Times. (H 480)

EDITOR. Large electrical and engineering company requires an editor for its monthly house magazine. The position calls for residence in the Midlands, with regular travelling to the company's other works, and it offers excellent prospects to a well-qualified man. A pension scheme is available, and £750 per annum would be paid to a man possessing all the requisite qualifications.—Box No. 3025, Electrical Times. (H 497)

ELECTRICAL/MECHANICAL INSPECTOR

An Electrical/Mechanical Inspector is required by a major British Oil Company for service in the Middle East. Applicants must have wide experience covering maintenance and inspection of installed plant associated with modern large generating stations with voltage range of 33 kV to 440 volts. Knowledge of flameproof switchgear an advantage. Possession of H.N.C. essential and qualifications up to A.M.I.E.E. desirable. Age limit 37 years. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages, kit allowance, free medical attention, good leave arrangement, pension scheme.

Write, giving personal particulars, and details of qualifications and experience, quoting Dept. F.7, to Box 3291 at 191 Gresham House, London, E.C.2. (H 270p)

TROUGHTON & YOUNG LTD., require for large industrial installation work:—DRAUGHTSMEN, SITE ENGINEERS, FOREMEN.—Write full details: Personnel Manager, Imperial Court, Basil Street, S.W.3. (H 518)

ELECTRICAL DRAUGHTSMEN required by major oil company for service in the Middle East. Must have served five years electrical engineering apprenticeship and have had five years D.O. experience in connection with electrical layouts of large industrial plants with underground cable networks. Should possess Higher National Certificate. Graduate or Associate membership of a corporate engineering body desirable but not essential. Maximum age limit 35 years. Attractive salary plus generous allowance in local currency. Free passages out and home, free medical attention, kit allowance, good leave arrangements, pension scheme.—Write, giving personal particulars and details of qualifications and experience, quoting Dept. F.192, to Box 3371 at 191 Gresham House, E.C.2. Applicants without above requirements will not be considered. (H 437)

ELECTRICAL DRAUGHTSMAN urgently required for diagrams and cabling of power stations and substations up to 132 kV. H.N.C. standard necessary and works apprenticeship preferred. State full details and salary requirement. Stable post, London office. Pension scheme. Salary according to experience.—Write Box 215, c/o Walter Judd, Ltd., 47 Gresham St., E.C.2. (H 438)

ELECTRICAL ENGINEER required for Far East as Salesman for Engineering Supplies. Should hold Higher National Certificate or equivalent; B.T.H., trained preferred. Age not over 30; commencing salary £500/£800 p.a. (according to age and experience) plus cost-of-living allowance; passage and furnished accommodation provided; Provident Fund; Pension Scheme.—Apply Staff Secretary, The Borneo Company Ltd., 143/9 Fenchurch Street, E.C.3. (H 502)

ELECTRICAL ENGINEER with production experience required by light engineering company in South Midlands. Applicants, who should not be over 35 years of age, would be required to supervise male and female labour in production shops.—Reply in confidence giving full particulars of qualifications, technical training, manufacturing experience and domestic circumstances, with details of previous positions held to Box No. 3037, Electrical Times. (H 527)

ENGINEER required for manufacture of paper insulated cables up to the highest voltages, also Engineer for dealing with electrical requirements for rubber and plastic cables. Degree or H.N.C. Standard desirable. Both situations involve a system of technical enquiry specifications and general technical matters. Age 22 to 35. Remuneration up to £650, according to experience, etc. Good prospects for promotion.—Box No. 3035, Electrical Times. (H 526)

ELECTRICIANS with good contracting experience, used to Pyrotenax and armoured cable installations, for work at Port Talbot, South Wales.—Write or apply, stating experience, to W. J. Furse & Co. (Manchester) Ltd., 20 Mount Street, Manchester 2. (H 494)

CANADA
ONTARIO

Large electrical company requires EXPERIENCED CIVIL, ELECTRICAL and MECHANICAL ENGINEERS, DRAUGHTSMEN and TECHNICIANS. Excellent opportunities. Call, or write, stating experience:

Dept. B., Ontario Immigration, Ontario House, Charles II St., London S.W.1. (H 418p)

ELECTRICAL ENGINEER, age 20/25, with regular electrical training, preferably Higher National Certificate, having completed conscription service, required to train as Transformer Sales Estimator.—Write to JHBB, Gresham Transformers Ltd., Twickenham Road, Hanworth, Middlesex. (H 515)

ELECTRICAL INSTRUMENT MECHANIC required by major Persian Gulf Oil Company. Full apprenticeship with reputable instrument manufacturer essential, and experience in manufacture and servicing of all types of electrical meters and instruments, including protective relays, automatic voltage regulators, etc. Higher National Certificate desirable. Age under 35. Starting salary £630 p.a. clear. Free messing and accommodation or allowance in lieu. Kit allowance, pension scheme.—Write, giving details and quoting K1159, to Box "N.T.," c/o J. W. Vickers and Co., Ltd., 7/8 Great Winchester Street, London E.C.2. (H 513)

ELECTRICAL OR CIVIL ENGINEER required as chief assistant in large organisation carrying out overhead line construction work. Must have experience in design and field work. Good prospects and superannuation.—Write, in confidence, to Box No. 2073, Electrical Times, giving full particulars and salary required. (H 355)

GENERAL ASSISTANT ENGINEER, Construction Department, Divisional Headquarters. Experience required in electrical or mechanical engineering construction, technical analysis and preparation of specifications. Higher National Certificate preferable. N.J.B. conditions of service and salary commencing £437 rising annually to £569 with ultimate maximum £604 plus London Allowance.—Application forms obtainable from Divisional Secretary, British Electricity Authority, South Eastern Division, Lower Ham Road, Kingston-upon-Thames, to be returned by February 10, 1951. (H 530)

LIGHTING ENGINEER required in the Illuminating Engineering Dept. of Ekco-Ensign Electric Ltd. Applicants should be fully conversant with methods of modern lighting practice, and possess a good general knowledge of lamps and lighting equipment. The work will entail the preparation of lighting schemes, specifications, quotations, reports, etc., and interviewing prospective customers. Membership of the I.E.S. though not essential, will be regarded as an asset. The appointment carries a good salary and is pensionable.—Write, giving full details of experience, age, etc., to Chief Illuminating Engineer, 5 Vigo Street, London W.1. (H 528)

LIGHTING ENGINEERING ASSISTANT for the preparation of technical publications and similar duties. Applicants should possess a good general knowledge of tungsten and fluorescent lamps and lighting equipment. Minimum qualification—National Certificate in Electrical Engineering or equivalent. The appointment carries a good salary and is pensionable.—Write, giving full details of experience, age, etc., to Chief Technical Engineer Ekco-Ensign Electric Ltd., 5 Vigo Street, London W.1. (H 543)

OIL Refinery Contractors require a qualified ENGINEER to be responsible for specifying and selecting all types of pumps, motors, turbines, compressors, etc., used in the refining industry. Applicants should have had past experience of such equipment, particularly application of process type centrifugal pumps in the petroleum industry.—Write fully, Foster Wheeler Ltd., 3 Ixworth Place, London S.W.3. (H 399)

POWER ENGINEER required for factory in North West. Applicants should be qualified electrical engineers who have had thorough experience not only in the operation and maintenance of high pressure steam plant but in the design, installation and maintenance of steam and electricity services. Salary in accordance with experience but not less than £800 p.a.—Write full particulars (age, qualifications, positions held, present salary, etc.) to Box No. 3029, Electrical Times. (H 509)

PRESS OFFICER. A company, internationally known in the electrical and engineering world, requires a really first-class Press Officer who must know, and be known, to the Technical and General Press—contacts overseas an advantage. Applicants must possess sound technical qualifications, and the skill and enthusiasm necessary to produce continuously excellent articles on the company's varied activities. Salary £1,350 to £1,500 a year according to qualifications. Pension scheme available.—Box No. 3023, Electrical Times. (H 498)

QUALIFIED ELECTRICAL ENGINEER, commercial experience essential, required for responsible permanent position Pakistan. Salary approximately £1,200 p.a. and appropriate expenses. Single man aged 30 to 35 preferred. Applicants must have sound knowledge theory and practice of power, transmission and distribution. Knowledge of line communication system an advantage. The post offers good prospects with old established company.—Apply Box No. 2081, Electrical Times. (H 366)

REPRESENTATIVES, with live connections wanted by electrical wholesalers who are enlarging sales staff, for areas: Surrey and Greater London, Essex and Greater London. Salary, commission and expenses.—Write giving full details in strict confidence, to Box No. 3021, Electrical Times (H 496)

SENIOR AND JUNIOR DRAUGHTSMEN for electrical switch and control gear. Superannuation and profit-sharing schemes in operation.—Apply, giving age, with details of experience and technical education, to The Switchgear Manager, The Electric Construction Co. Ltd., Wolverhampton. (H 493)

SENIOR OR INTERMEDIATE DRAUGHTSMAN required, with sound general engineering experience. Ordinary National Certificate desirable. Five-day week. Staff canteen.—Apply: Electric Furnace Co., Ltd., 161 Queens Road, Weybridge. (H 504)

SHIFT CHARGE ENGINEER for Electricity Supply Undertaking in Baghdad. Applications are invited from suitably qualified engineers, preferably between 25 and 35 years of age, who have had experience in the operation of a power station of at least 15,000 kW with medium pressure boilers. Salary £1,000 to £1,200 per annum, plus high cost of living allowance at present 18¾%, with a maximum of £300 p.a. Free house with heavy furniture will be supplied or a monthly house allowance of £12 in lieu. Three-year contract, renewable, with first class passage each way for successful applicant and family (if married). Three months leave on full pay in U.K. on completion of 24 consecutive months in Iraq, first class leave passages being paid.—Box No. 2091, Electrical Times. (H 401)

THE BRUSH ELECTRICAL ENGINEERING CO. LTD., Loughborough, invites applications from experienced TRANSFORMER DRAUGHTSMEN. Excellent working conditions, canteen facilities, etc.—Applicants should write giving full details of training and experience to the Technical Director. (H 414)

THE makers of Atlas Fluorescent Lamps require additional TECHNICAL STAFF for their main Production Unit. This opportunity offers an interesting career to prospective Lamp Engineers with the right technical experience or training and with the right approach to high speed lamp production problems.—Apply Personnel Manager, Thorn Electrical Industries Ltd., Gt. Cambridge Road, Enfield. (H 542)

TRANSFORMER DRAUGHTSMEN required by Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames, Surrey, one having experience of transformers up to 2,000 kVA, and one having experience up to 100,000 kVA. Pension scheme. Five-day week.—Write, giving age, experience and salary required, to Chief Mechanical Engineer. (H 481)

APPOINTMENTS WANTED

A CHARTERED ELECTRICAL ENGINEER, A.C.G.I., A.M.I.E.E., resident in London, desires change and seeks position of senior responsibility with scope for initiative. Sixteen years' first-class experience with leading manufacturers, home and abroad, in production, contracts, sales. Proved organising ability, experienced in general administration, supervision of staff, publicity, preparation and adjudication of comprehensive specifications and tenders.—Box No. 2051, Electrical Times. (H 282)

A. M.I.E.E. (34) seeks suitable progressive appointment abroad, preferably in Malaya, Africa or South America. Previous industrial experience abroad.—Box No. 2089, Electrical Times. (H 385)

ADVERTISER, age 37, over 20 years' experience all branches, wishes to emigrate to Australia. Would be pleased to hear from British firms having vacancies in that country.—Box No. 2057, Electrical Times. (H 288)

OUTSIDE SERVICE ENGINEER (39), owner-driver, lifetime experience plant, machinery, equipment, 2 year tech., 2 Govt. certs., A.I.P.R.E. Willing cover Home Counties or near. Specialist training welcomed. —90 Bensham Manor Road, North Croydon. Telephone: THO 2301. (H 466)

TWO FULLY QUALIFIED ELECTRICIANS with experience in all types of installation work in power stations, large factories and commercial establishments, at home and abroad, require progressive positions, preferably overseas.—Box No. 3017, Electrical Times. (H 479

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Specialists in all kinds of
PRESS CUTTING WORK,
Paper, Rubber, Felt, Asbestos, Cork, etc
VERY COMPETITIVE PRICES
Tools supplied if required
UNIVERSAL SUPPLIES (NORTHAMPTON) LTD.
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Having the organisation to produce Trade work from Blue prints to mass production competitively, are prepared to supply to Electricians for demonstration purposes

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Particulars on request (H 540p)

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines), Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel. 32996), electrical engineers and winding specialists. Distance no object. (F 739)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (H 268)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write Elton Levy Co., Ltd., St. Ermin's (West Side), Caxton Street, London, S.W.1. Phone: WHitehall 9621/2/3. (A 3)

STEEL, ALUMINIUM, BRASS and other non-ferrous sheets, strip, bars, off-cuts. Any quantity, gauge, size. Immediate payment.—Grades Sheared Metal Co., Ltd., Green Lane, Hounslow, Middlesex. Telephone: Feltham 3274. (H 368)

SURPLUS, REDUNDANT AND BANKRUPT STOCKS purchased for cash.—D. C. Hayes and Co., 60 Amhurst Road, London E.8. Amh. 3958. (H 490)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London, N.1. (A 13)

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CABLES & WIRE

ALL types T.R.S. and V.I.R. CABLE in stock. Buy now while obtainable. Send for price lists.—Northern Industries, Snow Hill, Manchester 4. (D 50)

CABLE drums. About 250 secondhand wooden cable drums, 31 in. to 54 in. outside diameter, in sound condition, for disposal.—Apply to Platt Metals Ltd., Metalex Works, Gt. Cambridge Road, Enfield, Middlesex. (Enfield 3425.) (H 491)

LARGE stocks P.I.L.C., Armoured and Unarmoured CABLES, suitable for mines and quarries, also light duty flexibles, users only.—Inquiries to Box No. 2059, Electrical Times. (H 305)

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IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed and immediate delivery. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

AUCTIONS

By Order of the Minister of Supply

G R

NO. 1 R.E. SUB-DEPOT. SOUTH LITTLETON
Near Evesham, Worcestershire.
Important Sale by Auction
of
GOVERNMENT SURPLUS
PLANT AND STORES

including: 41 Paddle Mixers with Diesel Engines, 16 Concrete Mixers, Water Pumping Sets, Generating Sets, 6 Clark Fork Lifts, Fuel Injection Pumps with Lister Diesel Engines, Water Chlorifiers.

42 DECAUVILLS LOCOS
ELECTRICAL EQUIPMENT

Including: Switch Boxes, Electric Light Bulbs, Condensers, capacitors.

L.T. BATTERIES, WATER FITTINGS, 1,000 PAIRS OF BINOCULARS.

Wireless equipment, Lavatory Basins, Sinks, Steel and Galvanised Water Tanks, Lavatory Cisterns, Asbestos and Everite Piping, also lying at Depots at
SHUT END AND MINWORTH
40-50 TONS OF ARC WELDING RODS 6 CRANES

To Be Sold by Auction by

E. G. RIGHTON & SON

at South Littleton Depot.
on
TUESDAY AND WEDNESDAY, FEBRUARY 27 AND 28, 1951
commencing at 11 a.m. daily.

View Days: Wednesday, Thursday, Friday and Monday, February 21, 22, 23 and 26, from 10 a.m. to 4 p.m. and Mornings of Sale from 9 a.m. till 11 a.m.

Admission by Catalogue only, price 6d. (postal orders only) to admit two persons to view and one on sale days may be obtained from the AUCTIONEERS' OFFICES, EVESHAM, WORCS. (Tel.: 6155). (H 506)

By Order of the Minister of Supply *Sixth Sale*

G R

BASE ORDNANCE DEPOT, BICESTER, OXON
20 miles from Banbury, 13 from Oxford and 15 from Aylesbury.
Important Sale by Auction of the
GOVERNMENT SURPLUS ENGINEERING, INDUSTRIAL AND MISCELLANEOUS EQUIPMENT
comprising
At Base Ordnance Depot, Bicester:
Secondary Batteries, Wireless Set Kits, large quantity of Lead Acid Batteries, Metal Boxes, Aerials, Tool Kits, Telephonic Equipment, Transformers, Alternators, Generators, Condensers, Tarpaulins, Deepwell Pumping Set and Engine, etc.
At No. 72 M.U., R.A.F., Roade, Northants
Large quantity of Bicycle Lamps, Trailer Spares, etc., and
At No. 216 M.U., R.A.F., Sutton Coldfield, Warwicks
Canvas Radiator Covers, Yellow Dope, etc., which

MIDLAND MARTS LIMITED

will sell on the site at Base Ordnance Depot, Bicester, on FRIDAY, FEBRUARY 16, 1951 at 11 a.m.
VIEW DAYS: WEDNESDAY AND THURSDAY, February 14 and 15, 9.30 a.m.—4.30 p.m. and on the morning of the sale 8.30 a.m.—11 a.m.
CATALOGUES: Price 6d. (postal orders only, no stamps) to admit two persons on view days and one person on sale day may be obtained from the AUCTIONEERS, MARKET SQUARE, BICESTER, OXON (Tel.: 73). (H 505)

ENGINEERING PLANT & MATERIALS

WELDING PLANT. Several Motor Generator Arc Welders, single, double and multi operator up to 600 amps. Input 400/440 V, 3-phase, 50 c/s. Also several single and double operator transformer arc welders. All modern units by well known makers. Attractive prices. Full details.—Write: Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 294)

GENERATING PLANT

GENERATOR for sale, 220 V d.c., 130 amp., with control panel. Driven by Tangye 34-b.h.p. single-cylinder horizontal diesel engine. Inspection at works in W. England.—F. J. Edwards Ltd., 359 Euston Road, London N.W.1. (H 488)

ALLEN GENERATOR for sale, 125 kW, 250 V d.c. 500 amp., driven by 200-h.p. vertical diesel engine, compressed-air starting, with compressor and slate panel, switchboard connections, tank. Inspect at works, W. England, F. J. Edwards Ltd., 359 Euston Road, London N.W.1. (H 489)

DIESEL ENGINES 375 H.P. PETTER VERTICAL 6-CYLINDER COLD STARTING DIESEL ENGINE, speed 500 r.p.m., complete with 6 h.p. Diesel driven starting compressor, air receiver, water and fuel tanks, etc. This engine for all practical purposes is equal to new, having only been used as a standby.
360/400 H.P. PAXMAN VERTICAL 12-CYLINDER MARK 12 R.P.H. DIESEL ENGINES, (3 available) with cylinders 7in. dia. x 7½in. stroke, 360 h.p. at 900 r.p.m.: 400 h.p. at 1,000 r.p.m.
225 H.P. CROSSLEY VERTICAL 6-CYLINDER COLD STARTING DIESEL ENGINE, speed 480 r.p.m. with starting compressor, air receiver, circulating pump, etc.
38 H.P. LISTER VERTICAL 4-CYLINDER DIESEL ENGINE, speed 1,000 r.p.m. 4½in. bore x 5½in. stroke, with flywheel 26in. dia., starting handle, water tank, etc.
27/34 H.P. NATIONAL VERTICAL 4-CYLINDER COLD STARTING DIESEL ENGINE 27 h.p. at 800 r.p.m.: 34 h.p. at 1,000 r.p.m., silencer, etc.
34 H.P. RUSTON VERTICAL RADIATOR-COOLED COLD STARTING DIESEL ENGINE, TYPE 3VSH, 34 h.p. at 1,500 r.p.m.: 29 h.p. at 1,300 r.p.m., air filter, extension shaft, etc.
24/36 H.P. PETTER VERTICAL DIESEL ENGINE, speed 1,000 r.p.m., 30 h.p. at 1,200 r.p.m., 36 h.p. at 1,500 r.p.m., fuel filter, air cleaner, etc.
30 H.P. TURNER VERTICAL 4-CYLINDER COLD STARTING DIESEL ENGINE, 1,300 r.p.m., 24 h.p. at 1,000 r.p.m. with radiator, fuel tank, spares, etc.
9 H.P. PETTER VERTICAL TWIN-CYLINDER DIESEL ENGINE, speed 1,500 r.p.m., complete with fuel tank, air filter, silencer, etc.
8 H.P. ARMSTRONG SIDDELEY VERTICAL SINGLE CYLINDER AIR-COOLED DIESEL ENGINE, speed 1,200 r.p.m., complete with fuel tank, pressure gauge, air filter, etc.
5 H.P. VERTICAL SINGLE-CYLINDER BY PETTER, speed 1,500 r.p.m., water cooling tank, air filter, etc.
Thos. W. Ward Ltd., Albion Works, Sheffield. Tel. 26311 (H 539)

DIESEL ALTERNATOR SETS from stock: 400/440 V, 3-phase, 50 c/s, 167 kVA "Waukesha/G.E.C.," 1,000 r.p.m.; 150 kVA "Petter/Brush," 500 r.p.m.; 135 kVA "Blackstone/Metro-Vick," 500 r.p.m.; 150 kW "General Motors/Westinghouse," 1,000 r.p.m.; 100 kVA "Deutz," 1,000 r.p.m.; 69 kVA "McLaren/Brush," 1,000 r.p.m.; 65 kVA "Meadows/McFarlane," 1,500 r.p.m.; 62.5 kVA "McLaren/Bruce-Peebles," 1,000 r.p.m.; 50 kVA "National/Bruce-Peebles," 750 r.p.m.; 20 kVA "Lister/Metro-Vick," 1,000 r.p.m. Full details with price post free on request. —Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 292)

GENERATOR, complete with diesel motor manufactured by Alpha Harris Engineering, Ltd., Crossley V.R., 6-cyl. vertical engine, capacity 556·7 cubic in. or 47·3 h.p. rating. Generator: 30 kVA 1,500 r.p.m., 3-phase, 8-power factor, 50 c/s, 400/230 V, 43·3 amp. 40-V exciter; exciter 20 amp. Exciter details: d.c. generator, 1·2 kW, 2,350 r.p.m., 48 V, 25 amp. Complete with water tank and 500-gall. oil storage tank. Can be viewed by appointment to W. Straker, Ltd., 22-28 Shand Street, S.E.1. (H 514)

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ARROW switches. 1,000 Arrow No. 100002 P.M. switches for sale. Brand new. Offers.—Mitchell Electric Ltd., Tennant Street, Birmingham 15. (H 465)

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PURLEY CHOKES AND BALLASTS. Our 80-w. Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

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A.C./D.C. SLOTMETERS (prepayment meters), all types and sizes. We supply Electricity Boards and Govt. Depts. Billiard Switches and Time Switches from stock. If you need reliable instruments write to: Brent Electrical Co., 6 Holmdale Gardens, Hendon, London N.W.4. (A 15)

A.C. and d.c. Quarterly and Prepayment METERS.—Electric Meter Co., Castor Road, Brixham. (H 332)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

HOUSE SERVICE METERS, from 5s. Guaranteed two years.—Electric Meter Co., Castor Road, Brixham. (H 333)

METERS a.c. and d.c., new and reconditioned, all types. Quarterly, single and 3-phase, 3 and 4-wire, 2½ to 1,000 amps. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amps. M.D.I. Billiards Switches, Rent Collectors. Prices from 5/-, carriage paid. Two-year guarantee. Immediate delivery.—Illustrated catalogue from The Electric Meter Company, Castor Road, Brixham. (H 331)

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MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

WALSALL 15 amp. 3-pin watertight SWITCH PLUGS complete 25/- each. Revo 6 way, 15 amp. double pole 1/c FUSEBOARDS each way controlled by 5 amp double pole switch. £2 each.—Ryness Ltd., 178 Stamford Hill, London N.16. (H 476)

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COUNTY COUNCIL OF THE WEST RIDING OF YORKSHIRE

SALE OF TRANSFORMER

THE County Council has for sale by tender a British Westinghouse Electric Mfg. Co's Transformer, 16 kW, 400 V to 200 V, 50 cycles, Serial No. B1092, Specification 31177, oil-cooled, which can be inspected at the County Supplies Department, Cliff Lane, Wakefield. Tender forms, which may be obtained from the Chief Officer of Supplies, County Supplies Department, Cliff Lane, Wakefield, must be returned to the undersigned, in the envelope provided, not later than 10 a.m. on Friday, March 9, 1951.

BERNARD KENYON,
Clerk of the County Council.
County Hall, Wakefield. (H 516)

500—50 M.F. 275 V T.C.C. CONDENSERS, can type. Surplus to requirements. Offer considered for the whole or part. Samples sent upon request 7s. each.—Electro-Mechanical Supplies Ltd., 39 Queens Road, Coventry. (H 423)

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A.C. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

A.C. and D.C. Motors, Alternators, Generators, Generating Sets, Transformers, Welders, Plating equipment, Control Gear, Switchgear, Portable Electric Tools, etc. Write for current electrical stock list, post free.—Thos. W. Ward, Ltd., Albion Works, Sheffield (Phone 26311, ext. 347). (H 291)

BRAND NEW A.C. Motors from stock: 1/3 to 150 h.p. Slip Ring and Squirrel Cage, 400/440 V, 3-phase, 50 c/s at 750, 1,000 and 1,500 r.p.m., with or without control gear. Immediate dispatch from stock. Attractive prices. —Full details post free from Thos. W. Ward, Ltd., Albion Works, Sheffield. Phone 26311 (ext. 347). (H 293)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

NEW A.C. 400/3/50 INDUCTION MOTORS. Two 12½-h.p. 1,450-r.p.m., drip proof, £22 each. Two 5-h.p., 720-r.p.m., totally enclosed, fan cooled, £34 each. One 4-h.p., 720-r.p.m., drip proof, £16. One motor-driven (2-h.p., 400/3/50) air compressor, automatic controlled, with container gauges, etc., £45.—J. Bateson Ltd., Gibraltar Works, Parkinson Lane, Halifax. (H 495)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (D 17p)

225 H.P. slip-ring MOTOR by A.S.E.A. 400/3/50, 485 r.p.m.
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170 h.p. compensated Induction MOTOR by E.E.C. 400/3/50, 720 r.p.m.
150 h.p. 350 kVA synchronous Induction MOTOR by Mather and Platt, 400/3/50, 750 r.p.m.
135 h.p. S/C Induction MOTOR by E.E.C. 400/3/50, 589 r.p.m.
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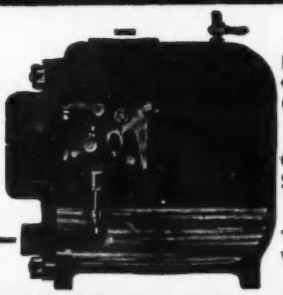

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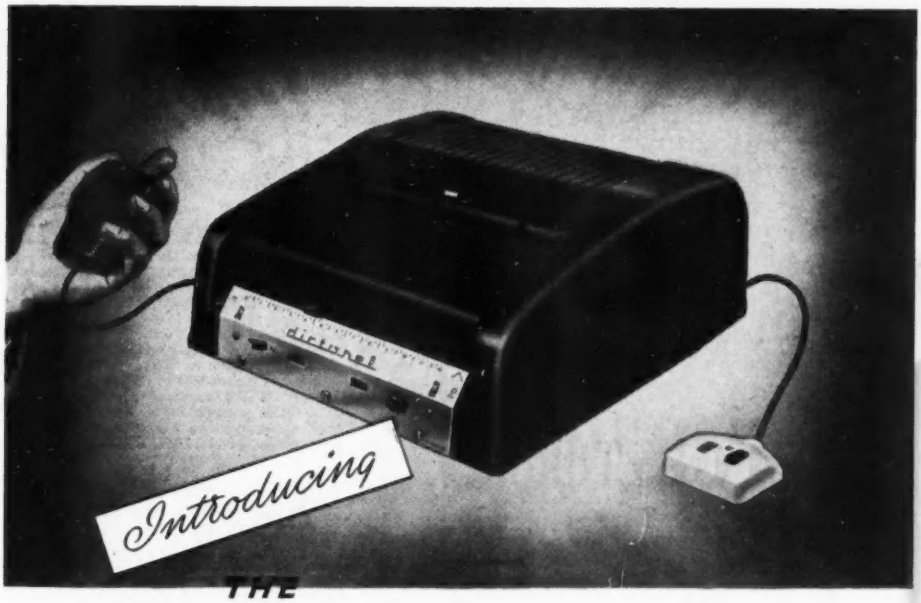

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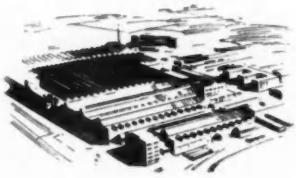

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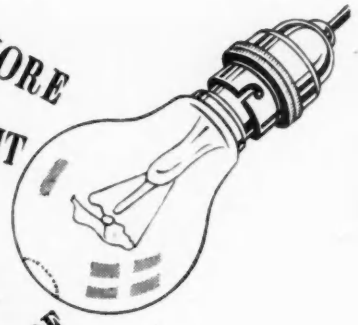

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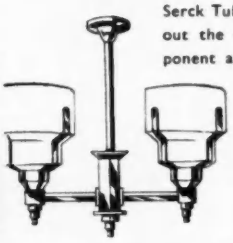

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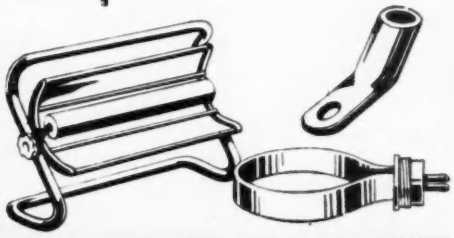

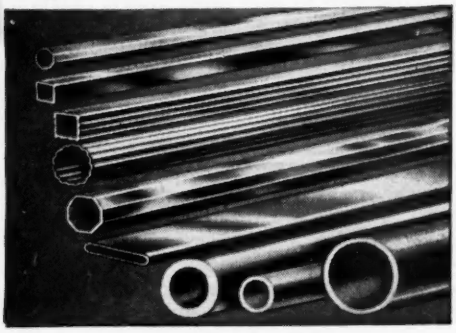

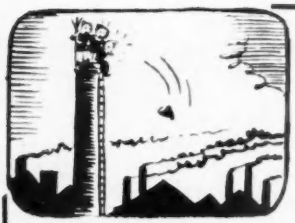

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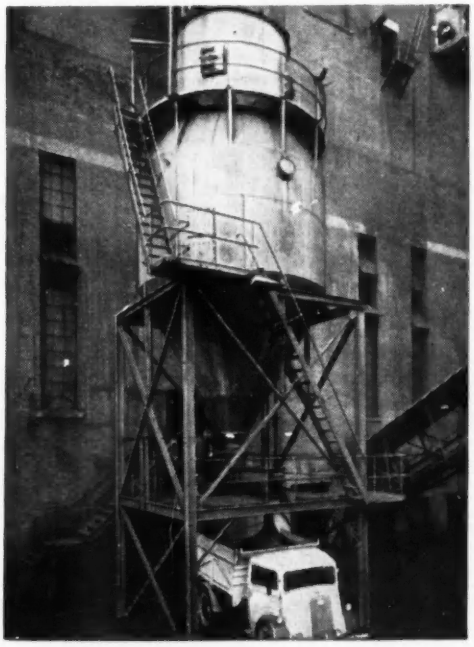

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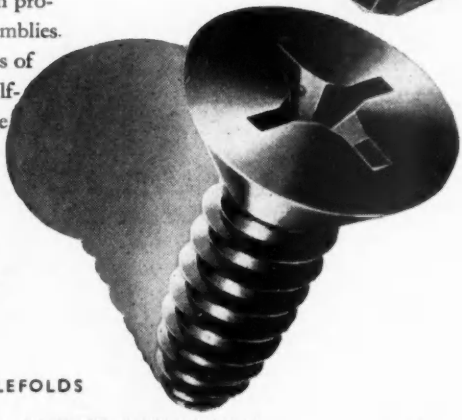

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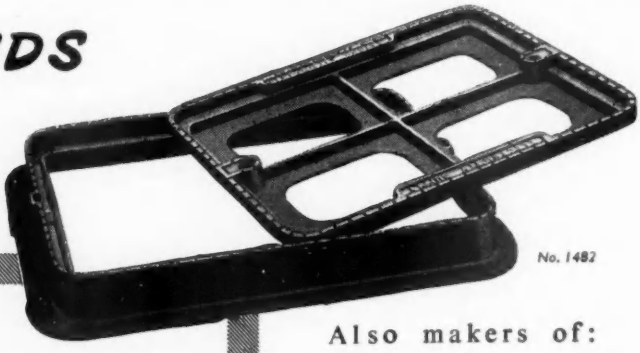

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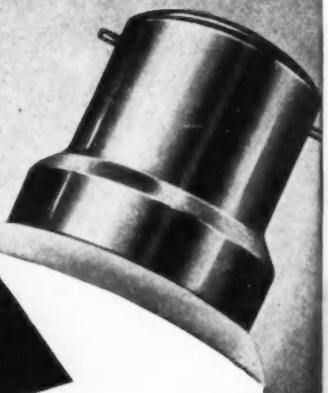

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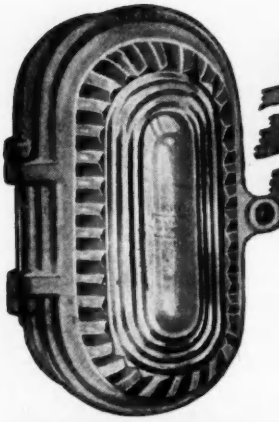

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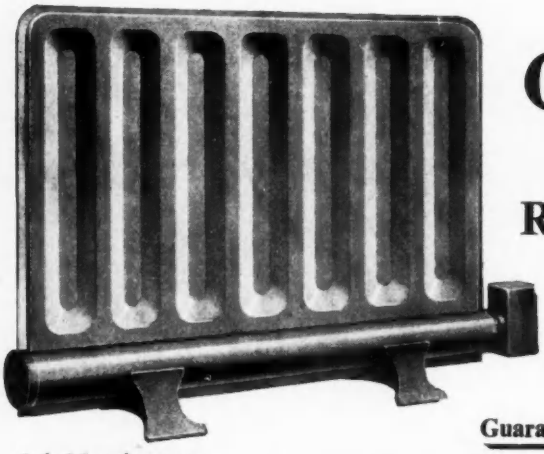

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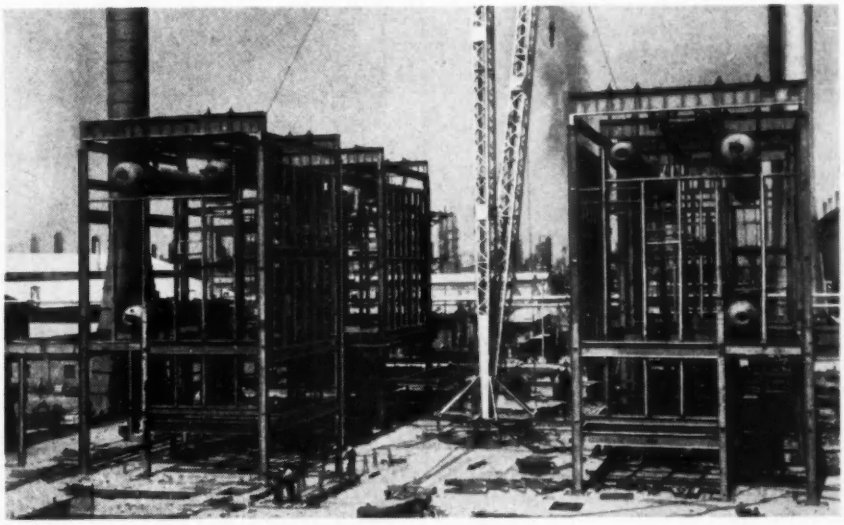

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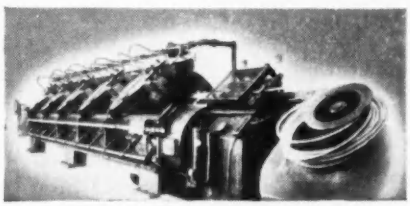

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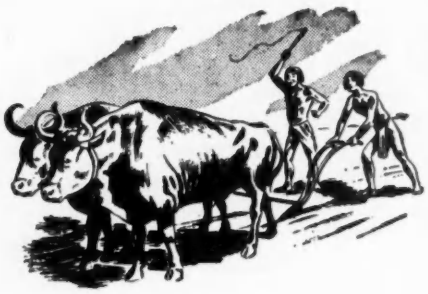

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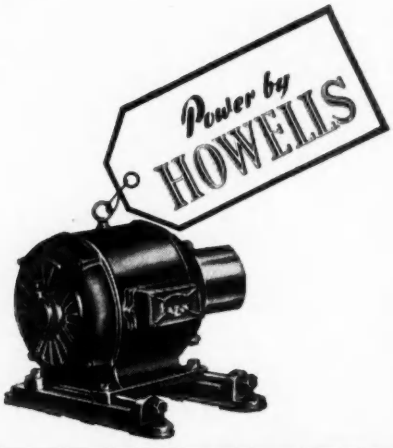

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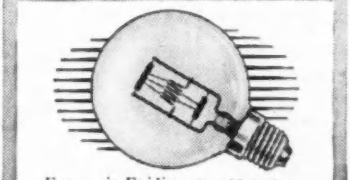

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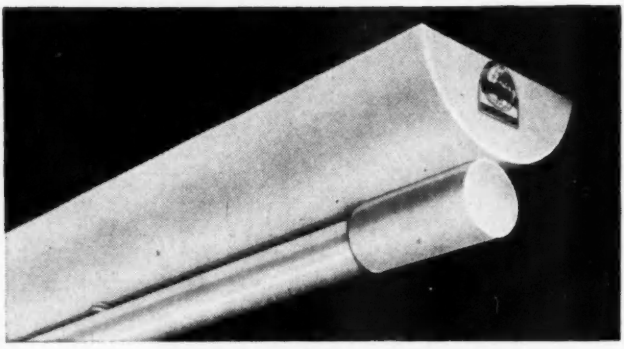

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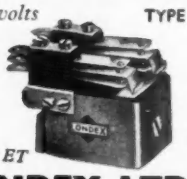

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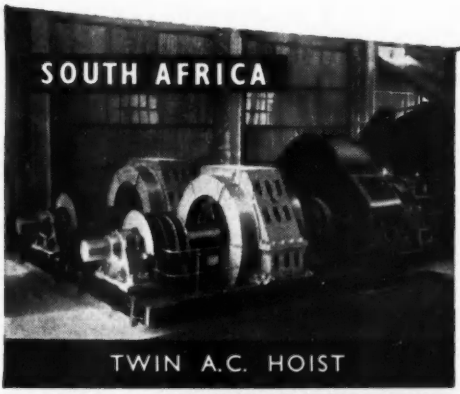

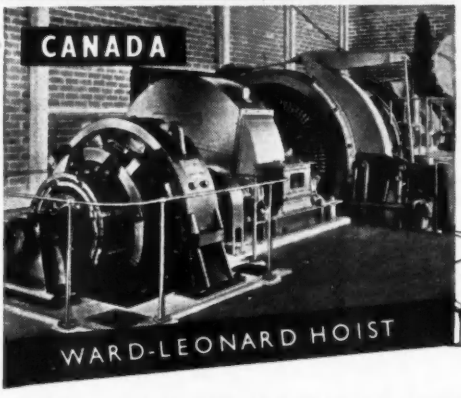

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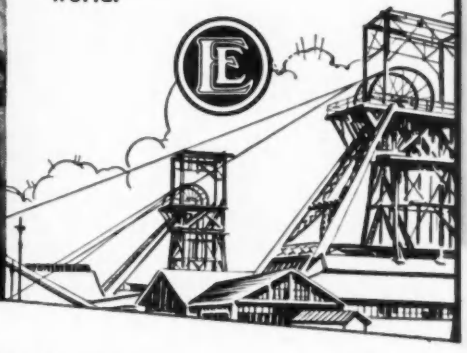

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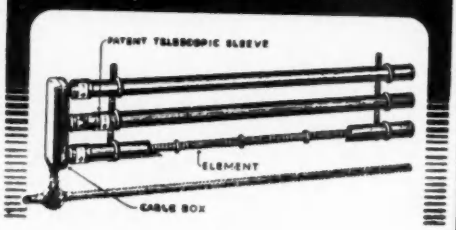

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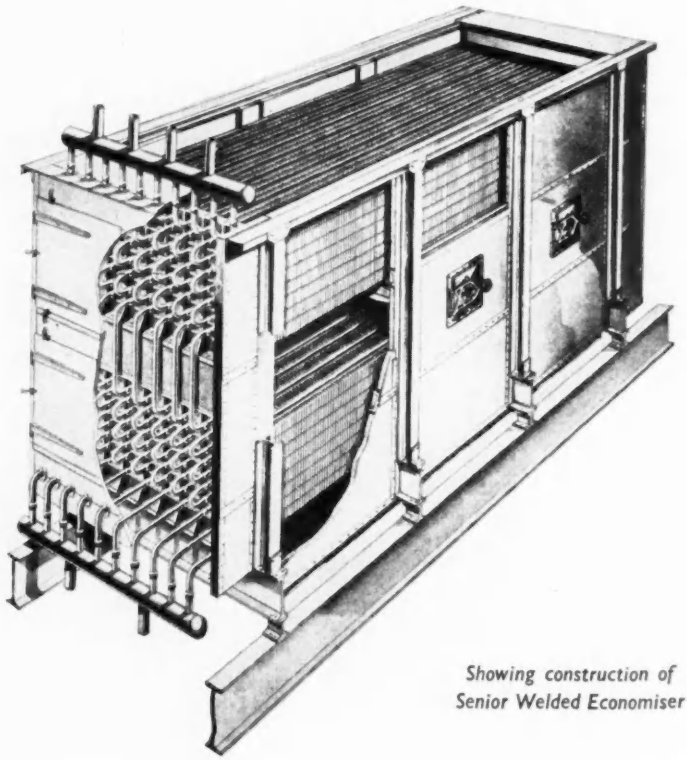

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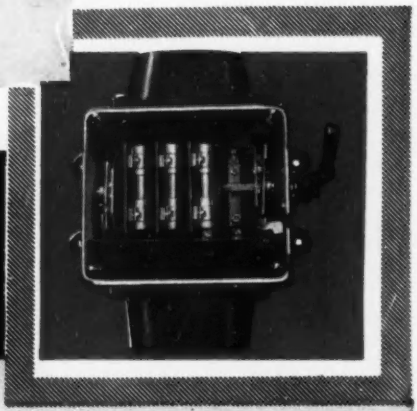

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